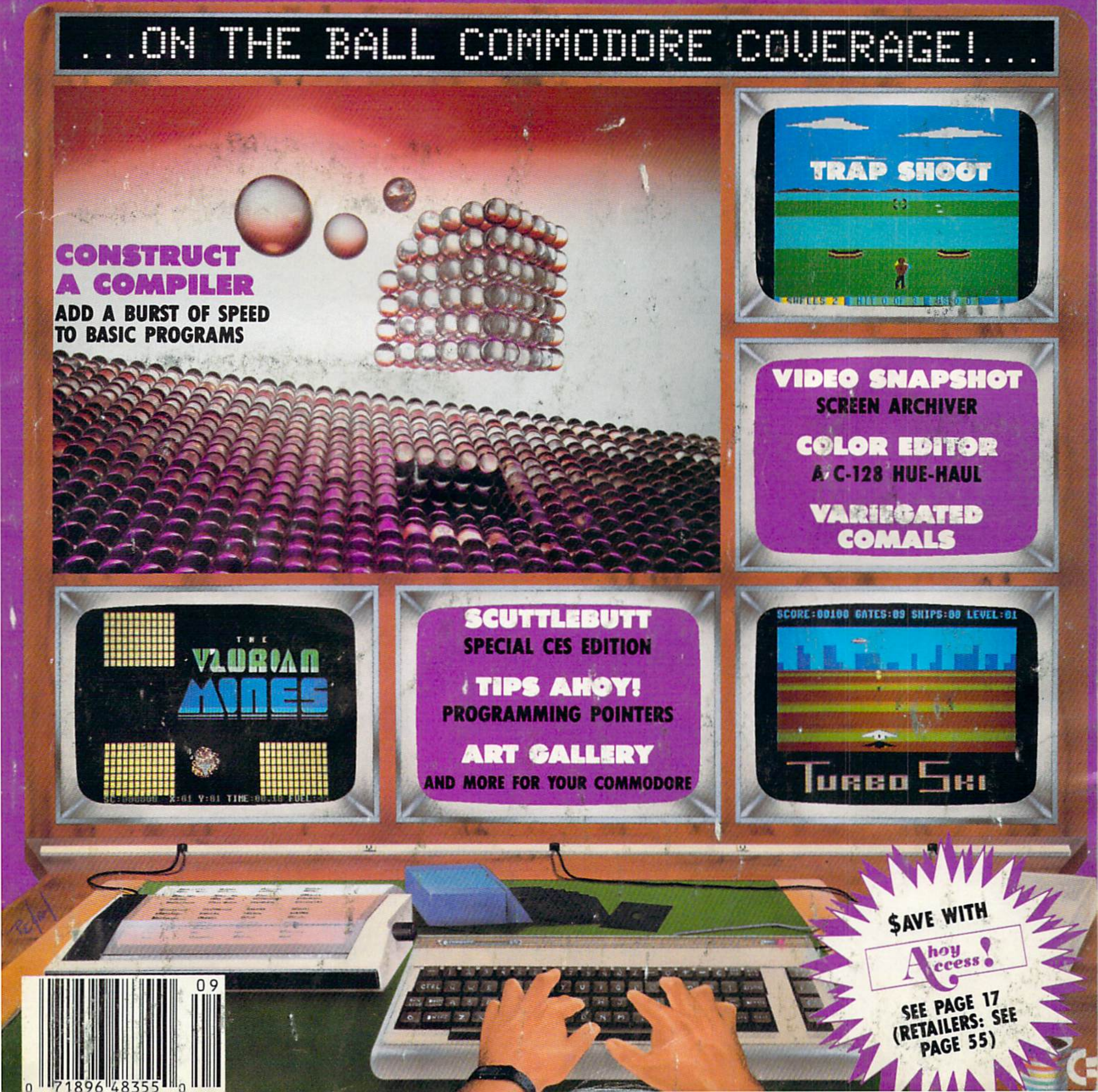
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VIEW FROM THE BRIDGE

Working at *Ahoy!*, it's easy to forget that we're publishing a national magazine and imagine ourselves cranking a mimeograph, churning out copies of a club newsletter. That's because our body of readers has always seemed more like a club: a group of individuals knowledgeable about a certain subject and united by their common interest, with strong, constantly voiced opinions about the policies the group should follow.

We like that feeling – it turns a workload that should induce ulcers into a kind of fulltime hobby. It's easy to give 100% making every page of *Ahoy!* just right when you know that all the extra effort will be appreciated. (And when that thought fails to inspire us, we think of the angry letters we'll get if we slip up!)

From those angry letters, and from the complimentary ones, we know that many of you share our "club" feeling. But why let it remain only a feeling – when we can turn it into something tangible that can benefit us all?

If you're a subscriber, you're already a member of the *Ahoy!* Access Club. In the past you've received bimonthly editions of the *Clipper* bound into your magazine, offering discounts and other special deals on a range of products advertised in *Ahoy!*

If you found past editions of the *Clipper* valuable, you'll find future editions indispensable! Beginning monthly publication in October, the *Clipper* will anchor the revitalized *Ahoy!* Access Club – a true computer buyer's cooperative offering discounts on a wider range of mail order items than ever before, plus in-person discounts at retail outlets and computer shows around North America.

The best news of all is that membership is free to *Ahoy!* and *Ahoy!'s AmigaUser* subscribers (and available to no one else). Complete details on the *Clipper* and other special privileges of *Ahoy!* Access Club members can be found on page 17.

As for details of the latest *Ahoy!* magazine/club newsletter – look no further!

• It's getting harder and harder for Dale Rupert to think of things he hasn't taught you to do on the 64 and 128. But for this issue and several to come, he's come up with a goody: building a BASIC compiler piece by piece. This month's *Rupert Report* covers the first stage of your *Lightning Speed Compiler*. (Turn to page 44.)

• We've seen numerous programs that dump a screen to your printer, and even published one or two. But Jim Partin's *Video Snapshot* does an excellent job of saving your favorite screens to disk. (Turn to page 30.)

At press time, Firebird had not yet selected the winner and runners-up of its Advanced OCP Art Studio contest.

• This issue includes two excellent reasons for C-64 users to move up to a C-128: Richard Curcio's *Color Editor*, for altering the color sources of text and graphic images (turn to page 37); and Mike Hoyt's *The V'Lurian Mines*, challenging you to pirate the crystal-filled and danger-fraught bowels of an alien planet (turn to page 56).

While this issue contains many more features worthy of mention, we'd rather use the space remaining to wish the best of luck to Cleve Blakemore. That's bad news for the many readers who've called in with questions and benefitted from his expertise – good news for the even more numerous fans of his C-64 and 128 games.

The good news for everyone is that we'll be publishing monthly for the entire fall and winter. See you in October...and November, December, January, and February.

– David Allikas

Reader Service No. 264

SCUTTLEBUTT

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Okidata's new printers permit downline-loading of up to 256 characters, providing a wide choice of typefaces. *READER SERVICE NO. 252*

CES REPORT

Twice a year, we check in at the Consumer Electronics Show (held in January and June) to find out the state of the Commodore 8-bit market. If the 64 and 128 are thriving, the third party manufacturers are there to hawk their forthcoming wares to retailers. If the market is in trouble, there are a lot of empty booths where software companies used to be. We know there are more scientific methods of business forecasting, but we get a free vacation this way.

We're happy to report that the 64 and 128 were better represented at the June '88 CES than they had been in the past two or three shows. But there's a catch. While a large amount of software was on display, the vast majority of it was games (so many games, in fact, that we don't have room in this month's *Scuttlebutt* to mention them all).

It's encouraging to observe the high degree of confidence which major game manufacturers have in the continued success of the 64 and 128. But it's distressing to see such hard evidence of a perception widely held around the country: that the 64 and 128 have no real longterm future except as game machines.

We think that perception is wrong. There's too much else one can do with a 64/128 for it ever to become a Nintendo with typewriter keys. As people continue buying the computers, they'll continue discovering these other uses—just as we and our readers have been doing together for nearly five years. Smart software and peripheral makers will realize this, and develop new non-entertainment products for these new users—and for the old users who continue taking their 64's and 128's to heights Commodore never imagined.

GEOS 2.0

GEOS 2.0 ($59.95) improves upon the first coming of Berkeley's Graphic Environment Operating System for the C-64 by adding five new applications and enhancing versions of the original ones. Included are the *geoPaint* graphics editor, *geoWrite 2.1,* a 38% faster *geoSpell, Paint Drivers* (for dressing documents up with columns, borders, and other graphics), *Text Grabber* (for importing other WP programs to the GEOS environment), *geoMerge* (for form letters), *geoLaser* (for use with the Apple LaserWriter), support for over 70 printers, and a set of "pop-up" accessories.

Berkeley Softworks, 415-644-0883 (see address list, page 14).

FOUR FROM OKIDATA

Four new printers from Okidata:

The nine-pin Microline 320 ($499) and wide carriage 321 ($699) reach a speed of 300 cps in Draft mode. A 250 cps Utility mode and 63 cps NLQ mode are also available. Two resident NLQ fonts are included.

The Microline 390 ($699) and wide-carriage 391 ($949) offer 24-pin printing. Speed is 270 cps in Utility mode and 90 cps in NLQ.

All four printers feature bottom feed, which prevents paper jams by avoiding wrapping labels and heavy stock around the platen; front panel selection of speed, print quality, and pitch; a 23K buffer; and the ability to print on paper as wide as 9½" (on the 320 and 390) or 16" (on the 321 and 391).

Okidata, 609-235-2600 (see address list, page 14).

NEW MATH

Mathematical Function Analyst ($29.95) performs an assortment of numeric tasks, including finding roots, doing definite integrals, determining area under curve, curve length, cen-

ter of gravity, volume and surface area of revolution, finding derivative for slope, local maxima or minima, and far too many more to list. If you have use for a C-64 disk full of formulas like these, it certainly seems like everything's here.

Free Spirit Software, Inc., 800-552-6777 or 312-352-7323 (see address list, page 14).

CUSTOM AWARDS

Award Maker Plus ($39.95) lets C-64 owners create custom certificates, coupons, and the like. Graphics for home, education, and business uses are included. Border designs can be printed in color or black and white.

Baudville, 616-698-0888 (see address list, page 14).

INVESTMENT RETURN

Version 2.1 of the Investment Simulation Program (ISP) for the C-64 and C-128 works faster than the previous version, and can save output to disk files that can be used with a word processor. The program computes internal and equity ROR's, present net worth, life-cycle cost, and capitalized present value from cash flows covering up to 200 time periods. Included are six different worksheets for personal and business applications, among them car, education, and general business. In most cases, an investor can simply load a worksheet and correct the title and data to suit a specific project. Price is $36.00, plus 10% for shipping in continental US.

Pyxis Software, 719-596-6465 (see address list, page 14).

BOARD OF EDUCATION

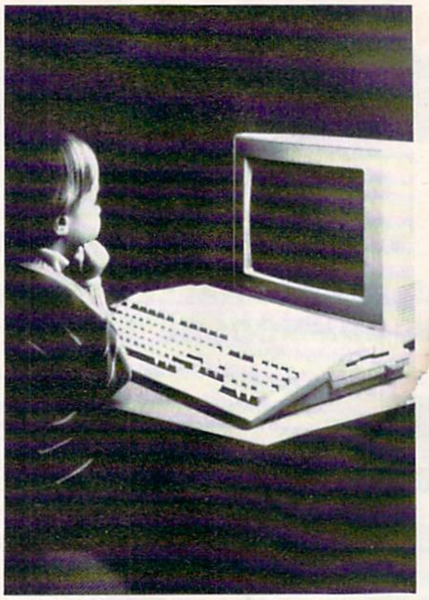
The Michigan Association for Computer Users in Learning (MACUL) has opened a teachers' BBS on the University of Michigan's CONFER system. The board serves as a public forum for discussion of current trends in computer technology. To join CONFER, write or call Joan McCoy, School of Education, The University of Michigan, Ann Arbor, MI 48109-1259 (phone: 313-763-9497).

MACUL, 313-595-2493 (see address list, page 14).

BONUS TRACKS

Through September 30, Fuji will include a free 11th disk in specially marked 10-packs of Fuji MD2D (double sided, double density) 5¼" disks.

Fuji Photo Film U.S.A., Inc. (see address list, page 14).



Computer Learning Month is coming.
READER SERVICE NO. 253

EDUCATION EVENTS

There's still time for educators to get in on Computer Learning Month (October 1988). Contests, sweepstakes, and local events around the US and Canada are planned. Detailed information is provided in the official CLM publication, available on written request.

Computer Learning Month (see address list, page 14).

LOAD 'EM

Blue Lion's latest travelogue, *Ticket to Hollywood* ($29.95), takes the 64 user through eight decades of movie history. Aided by six 3-D maps, you can explore Tinsel Town's landmarks or follow the footsteps of your favorite stars as you gather the clues needed to solve one of 25 mysteries.

Blue Lion Software, 617-876-2500 (see address list, page 14).

MIDI CONVENTIONS

Two upcoming dates are scheduled for MIDI Expo, the Conference and Exposition of MIDI Music. MIDI Expo West will occur at Anaheim's Marriott Convention Center on September 10-11, and New York's second annual MIDI Expo will be held in the Sheraton Centre on December 3-4. At each, MIDI enthusiasts will be able to explore the range of digital music instruments, equipment, and services through product demonstrations and a seminar program covering MIDI basics, sampling techniques, and other topics.

Expocon Management Associates, 203-259-5734 (see address list, page 14).

PRINTER REPAIR

Printer Troubleshooting & Repair provides users who have a basic understanding of electronics with answers to problems that commonly plague dot matrix, inkjet, and laser printers. 250 pages; $19.95.

Howard W. Sams & Company, 317-298-5400 (see address list, page 14).

KETEK SUPPORT

Computer accessories from Ketek, makers of the Command Center line of system enclosures:

The Sound Trap ($49.95) encloses almost any 80 column printer with sound-absorbing foam and wood to reduce noise by up to 90%. Included are an acrylic lid and a slide-out shelf for catching printout.

The Remote Power Controller ($89.00) provides outlets for up to five devices, each offering 3-way protection against surges and spikes. The base unit can mount behind or under your desk, while the 3⅜ x 5¾ x 1¼" controller is kept close at hand.

The Tilt/Swivel Monitor Stand ($14.95) lets you turn your monitor to the desired angle, with cushioned pads to hold the monitor securely in place.

Ketek, 319-338-7123 (see address list, page 14).

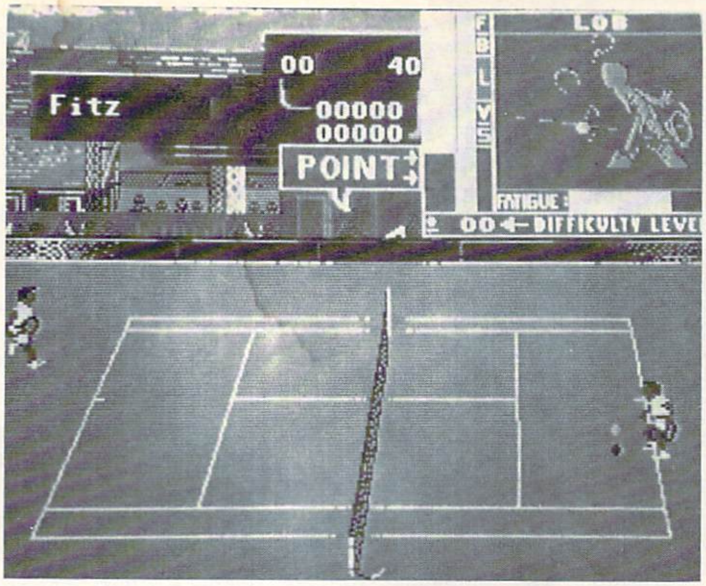
DEVICE # SWITCH

The Drive Box ($29.95) provides a switch to let users change device numbers on the 1541 or 1571, or turn off write protection. It installs in minutes, with some soldering required.

Free Spirit Software, Inc., 800-552-6777 or 312-352-7323 (see address list, page 14).

BRUSH UP

How's your knowledge of junior drum corps trivia—a little rusty? Don't be the laughingstock of your next cock-



Serve & Volley *against the computer or another human. Stats can be saved, allowing you to let the computer play for you if your tennis elbow acts up.* *READER SERVICE NO. 254*

tail party. *Corquest* makes you director of a drum corps which you advance through maneuvers by correctly answering questions on drum corps history. There are versions for the 70's and 80's; $24.95 each, or both for $39.95.

Consort Software Company (see address list, page 14).

LET THE GAMES BEGIN

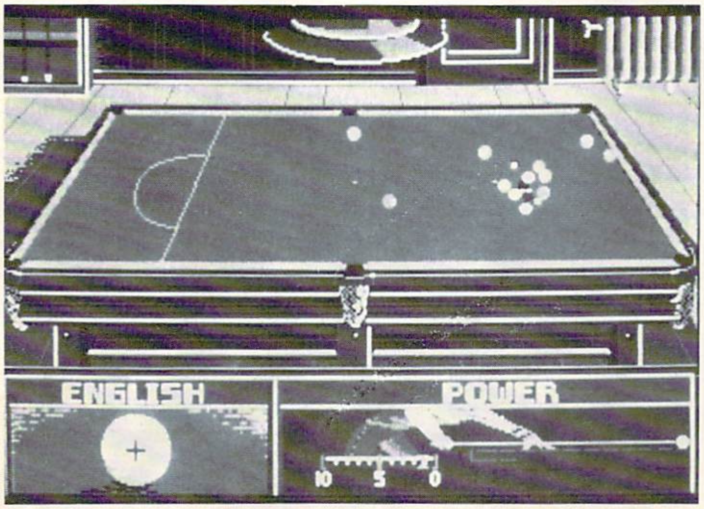
Four sports simulations for the 64 from Accolade, each $29.95, each for one or two players:

Utilizing the same interface as *Hardball* and *4th & Inches, Fast Break* offers a TV camera's-eye view of full-court, three-on-three B-ball. Defensive and offensive plays are selected from a menu, or original strategies can be designed.

Serve & Volley simulates a tennis match with an emphasis on correct ball placement, timing, and stroke selection. Included are three different court surfaces, three serves, five hits, three difficulty levels, and a full court view with action windows. Players can adjust endurance, forehand v. backhand, and power v. accuracy for each player.

Featuring both top down and 3-D views of the table, *Rack 'Em* includes five billiards games: snooker, bumper pool, straight pool, 8-ball, and 9-ball. The player adjusts such variables as object ball and pocket, aim, english, and power. Other features are the ability to retake the last shot, save the best 10 shots, or perform trick shots, and a bumper pool construction set.

The first-person perspective of *T.K.O.* is designed to give the player the feeling of what it's like to be in the boxing ring. Offensive and defensive maneuvers are available for each player. Each boxer's face shows the damage he has sustained, including black eyes, fat lips, swollen cheeks, bruised forehead, and cut jaw.



In addition to five popular billiards games, Rack 'Em *includes a contest that lets players establish their own rules and move balls.* *READER SERVICE NO. 255*



***Bard's Tale III's** auto-mapping function details your location in the wilderness and plots your way through the game's 84 dungeon levels.* *READER SERVICE NO. 256*

Fast Break, Rack 'Em, and *Serve & Volley* are slated for release in the third quarter; *T.K.O.* in the fourth.

Also from Accolade for the 64, *Bubble Ghost* ($29.95) requires you to blow a bubble through a castle's 35 hazard-filled, increasingly difficult rooms. Disembodied heads, electric fans, and candles are among your obstacles, as well as numerous sharp objects like shears and spikes that can burst your bubble. Secret passageways can save you time and help you avoid some of the more difficult levels.

Finally from Accolade comes the new All Time Favorites product line, offering a number of past titles for $14.95 each, including *Hardball, Ace of Aces, Fight Night,* and *Killed Until Dead* for the 64.

Accolade, 408-985-1700 (see address list, page 14).

Three C-64 games from Absolute Entertainment, each $34.95:

F-18 Hornet simulates the takeoff, landing, and Top Gun-style combat in a carrier-based fighter. Training sessions, aerial assaults, supply drops, and other missions test the player's flying skill.

Based on the arcade hit, *Crossbow* brings the monsters and mayhem of the dark ages to life with 12 hi-res screens and over 100 sound effects.

Garry Kitchen's *Space* follows a lone star fighter on his last mission across 512 space sectors that include 64 unique planets and numerous asteroids and enemy attackers.

Crossbow was available at press time; *F-18 Hornet* and *Space* are scheduled for late third quarter release.

Absolute Entertainment, 201-652-1227 (see address list, page 14).

For the 64 from Activision:

Based on the arcade game, *Rampage* ($34.95) lets the player guide a giant gorilla, lizard, or wolf on a destructive cross-country journey. Your monster will climb skyscrapers, swat attacking choppers, step on tanks, and swallow bystanders in as many as 157 different cities.

Moving right on down the evolutionary ladder, *Predator* ($29.95) lets you assume Arnold Schwarzenegger's movie role as the leader of an elite military team. Your mission is to battle your way through South American jungles, past militant guerillas, to rescue US diplomats from a terrorist stronghold. But once your unit deserts you, you're alone against the alien manhunter stalking you. Weaponry from hand grenades to flame throwers can be found and used throughout the game.

U.S.S. Ocean Ranger ($34.95) simulates a next-generation missile ship battling in the Bering Sea, Southeast Asia, Central America, and the Persian Gulf. Players move up the ranks from basic training to regular forces, on through covert CIA activities, and finally to elite National Security Council assignments. Missions involve battle with enemy destroyers, planes, and an equally powerful missile ship.

Activision, 415-329-0500 (see address list, page 14).

Like the movie it's based on, *Platoon* for the C-64 ($29.95) does not have a winner–instead, the player must see that his five man squad survives its missions, keep its sanity and morale intact, and returns to base safely. The game's six sections are increasingly arduous: picking up a box of explosives in a jungle and blowing a bridge; locating a village and searching its huts for a secret trap door; finding supplies in an underground tunnel network; fighting guerillas who surround a bunker at night; reaching a foxhole before a napalm air strike; and using grenades to take out the treacherous Sgt. Barnes, who is ensconsed in a foxhole.

Data East USA, Inc., 408-286-7074 (see address list, page 14).

Vampire's Empire ($29.95) sends you, as Dr. Van Helsing, through a dungeon maze armed with a ray of sunlight. Hordes of evil creatures stand between you and the lair of Count Dracula, whom you must expose to the light and destroy.

DigiTek, 813-933-8023 (see address list, page 14).

For the 64 from Electronic Arts:

If Irwin Rommel becomes any more popular, he'll be doing Pepsi commercials. Last month we reported on Electronic Arts' *Patton vs Rommel* and Datasoft's *Tobruk,* also starring the Desert Fox; now this month brings news of *Rommel Battles for North Africa* ($39.95) from Strategic Studies



Success in **Platoon** *is measured by four factors: your soldiers' morale, hits, ammo level, and score.* *READER SERVICE NO. 257*

Group (distributed by EA). The game recreates eight crucial North African battles, or lets you remake history with Warplan, a wargame construction kit, and Warpaint, a graphics editor.

Bard's Tale III: Thief of Fate ($39.95) finds the city of Skara Brae in ruins, thanks to the Mad God Tarjan. Your job is to assemble a group of adventurers who will travel the world in search of Tarjan to release the city from the bond of ruin. Included are more than 100 magic spells and 500 monsters, some of whom can join your party. The right mix of characters (chosen from up to 13 classes) is essential to making it through the 84 dungeon levels and 7 different dimensions.

In a future threatened by galactic war, *Reach for the Stars* ($39.95) gives you the responsibility for the propagation of your race. You must search for planets to colonize, manage your people's economic and social forces, and develop a strong space navy. Play all your cards right, and you'll become ruler of the galaxy.

Rockford ($29.99) lets you follow the famed archeologist of *Boulder Dash* around the globe in search of the Pharoah's gold pieces, the Emerald Erasmus, and the Apples of Eternal Youth.

The computer which controls the highways connecting the moons of Armegeddon has gone haywire, altering some of the magnetic side panels that keep vehicles on the roads. The result is *Roadwars* ($29.99), which you must win against the killer sparks, spikes, barriers, and vicious aliens.

Electronic Arts, 415-571-7171 (see address list, page 14).

Electronic Arts has made a minority investment in Strategic Simulations, Inc., acquiring the rights to distribute SSI software in the United States and Canada. The first EA/SSI releases for the C-64 will be three Advanced Dungeons & Dragons Products:

Pools of Radiance ($39.95) lets computerists "roll up" characters, in classic AD&D fashion, from four Classes, six Races, and nine Alignments. Cities, dungeons, and encounters are shown in 3-D. The player can control the characters during battle, or let the computer handle some or all of the action.

Heroes of the Lance ($29.95), derived from Dragons of Despair, the first Dragonlance game module, recreates



United they stand: EA (left) and SSI. READER SERVICE NO. 258

the epic battle between good and evil on the world of Krynn. The player guides eight characters into the ruins of the temple Xak Tsaroth to retrieve the Disks of Mishakal. This entails defeating the monstrous Draconians and surviving attacks from dwarves, skeletal undead, and other terrors.

The Dungeon Master's Assistant—Volume I, Encounters ($29.95) is SSI's first utility for AD&D tabletop players. The program includes over 1300 pregenerated monsters and characters, and over 1000 separate encounters.

Pools and *Heroes* are already available; *Encounters*, by late summer.

Strategic Simulations, Inc., 415-964-1353 (see address list, page 14).

Mindscape will publish SSI's backlist of C-64 strategy/simulation titles under its low-priced Thunder Mountain line. The first releases will be *Fortress, Battalion Commander, Nam,* and *Geopolitique 1990;* coming are *Cartels and Cutthroats, Combat Leader, Galactic Gladiators,* and *Queen of Hearts.*

Also from Mindscape comes *Captain Blood* ($34.95), utilizing both fractal and vector graphics to tell the story of the Captain's quest to destroy his half-dozen clones scattered around the galaxy which are sapping his energy.

Mindscape Inc., 312-480-7667 (see address list, page 14).

From Broderbund for the 64:

Based on the Atari coin-op classic and, amazingly enough, the first home computer adaptation of the movie to be published in North America, *Star Wars* ($29.95) puts the player in the role of Luke Skywalker, piloting an X-Wing Fighter in an attack on the Empire's Death Star.

Downhill Challenge ($24.95) simulates four styles of ski racing: downhill, slalom, giant slalom, and jumping. Each event offers three skill levels.

Two previously released titles added to Broderbund's $14.95 Value-Priced Software line: *Cauldron* (recover the golden broom stolen by the Pumpking and destroy the evil Witch Queen) and *Magnetron* (pilot a Photon fighter in combat against the 50 war bases orbiting the earth, or against bases of your own devising).

Broderbund Software, 415-492-3200 (see address list, page 14).

The following are for the 64 from Epyx, $39.95 each unless otherwise noted. Scheduled for release in the third quarter:

Battleship ($29.95) brings the famous board game to the computer screen, improved with graphics and digitized sound effects. Players can see

shrapnel tear into vessels, fires rage on deck, and holes appear broadside.

The Games–Summer Edition tests world class athletes in events like springboard diving, uneven parallel bars, velodrome sprint cycling, the hammer throw, hurdles, archery, and the rings. Camera angle views are designed to give the feeling of network TV coverage.

Though it sounds like a nuclear showdown, *Final Assault* takes the player on a mountain climbing expedition up some of the world's most treacherous peaks. Players must select their gear from over 50 available items–one wrong choice could be the difference between life and death.

Mind-Roll involves manipulating a bouncing and rolling ball through 3-D walls, floors, and ramps. Sharp turns, maze races, and obstacle courses must be negotiated.

The latest in Epyx's Masters Collection of software for the advanced gamer, *The Legend of Blacksilver* pits you against the evil Baron Targas, who has kidnapped the King and plans to submerge the existing continent and raise one from the ocean depths, populated with creations of his twisted mind. To stop him, players must travel through the kingdom (rife, of course, with monsters, sorcerors, natural disturbances, etc.), rescue the King, and fashion a sword of Blacksilver with which to capture Targas.

Scheduled for fourth quarter release: *Street Sports Football,* like previous titles in the series, forces players to put up with real life obstacles like puddles, oil slicks, and inconveniently parked cars. Plays can be picked from a computerized playbook, or designed from scratch.

Technocop, designed by U.S. Gold and distributed by Epyx, matches the Enforcers, a technologically advanced police force, against the international crime family known as D.O.A. The good guys' weapons include criminal radar detectors, .88 magnums, and V-Max, the most advanced auto ever built.

Another U.S. Gold design, *Sports-a-Roni* ($24.95) consists of events like a sack race down the streets of Naples, balancing pasta plates near the Leaning Tower of Pisa, climbing an olive oiled pole, vaulting the Arno River, and pillow fighting in a gondola.

Epyx will distribute seven games by UBIsoft, the French software house. The first titles will be *Trails of Honor,* released as part of Epyx's Masters Collection (see above) and involving the efforts by the rightful heir to the throne of a French kingdom to save his people from a false monarch; and *Ice Trashers*, a futuristic combination of ice hockey and soccer played amidst explosive devices, bottomless pits, and other dangers.

Epyx, Inc., 415-366-0606 (see address list this page).

MicroIllusions has acquired the rights to release games for the 64 starring a number of Hanna-Barbera characters. *The Flintstones, The Jetsons, Scooby-Doo,* and *Johnny Quest* are scheduled for fourth quarter release.

MicroIllusions, 800-522-2041 or 818-360-3715 (see address list, this page).

Zak McKracken and the Alien Mindbenders ($34.95) involves a journalist's quest to locate and thwart the aliens who are reducing the I.Q. of everyone in the world to single digits with a stupidity machine.

Lucasfilm Games, 415-662-1966 (see

Continued on page 36

Companies Mentioned in Scuttlebutt

Absolute Entertainment
251 Rock Road
Glen Rock, NJ 07452
Phone: 201-652-1227

Accolade
20813 Stevens Creek Blvd.
Cupertino, CA 95014
Phone: 408-446-5757

Activision
c/o **Mediagenic**

Artworx Software
1844 Penfield Road
Penfield, NY 14526
Phone: 800-828-6573
or 716-385-6120

Baudville
5380 52nd Street SE
Grand Rapids, MI 49508
Phone: 616-698-0888

Berkeley Softworks
2150 Shattuck Avenue
Berkeley, CA 94704
Phone: 415-644-0883

Blue Lion Software
90 Sherman Street
Cambridge, MA 02140
Phone: 617-876-2500

Broderbund Software
17 Paul Drive
San Rafael, CA 94903
Phone: 415-492-3200

Computer Learning Month
P.O. Box 60007
Palo Alto, CA 94306

Consort Software Co.
P.O. Box 1623
LaCrosse, WI 54601

Data East U.S.A., Inc.
470 Needles Drive
San Jose, CA 95112
Phone: 408-286-7074

DigiTek, Inc.
10415 North Florida Ave.,
Suite 410
Tampa, FL 33612
Phone: 813-933-8023

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

Epyx, Inc.
600 Galveston Drive
P.O. Box 8020
Redwood City, CA 94063
Phone: 415-366-0606

Expocon Management Associates, Inc.
3695 Post Road
Southport, CT 06490
Phone: 203-259-5734

First Row Software
900 E. 8th Ave.–Ste. 300
King of Prussia, PA 19406
Phone: 215-337-1500

Free Spirit Software Inc.
905 W. Hillgrove, Suite 6
LaGrange, IL 80525
Phone: 800-552-6777
or 312-352-7323

Fuji Photo Film U.S.A.
555 Taxter Road
Elmsford, NY 10523
Phone: 914-789-8148

Gamestar
c/o **Mediagenic**

Hi Tech Expressions
584 Broadway–Suite 1105
New York, NY 10012
Phone: 212-941-1224

Howard W. Sams & Co.
c/o **Macmillan**

Interplay Productions
1575 Corporate Drive
Costa Mesa, CA 92626
Phone: 714-549-2411

IntraCorp Inc.
14160 SW 139th Court
Miami, FL 33186
Phone: 305-252-9040

Ketek
P.O. Box 203
Oakdale, IA 52319
Phone: 319-338-7123

Lucasfilm Games
P.O. Box 2009
San Rafael, CA 94912
Phone: 415-662-1966

MACUL
Box 628
Westland, MI 48185
Phone: 313-595-2493

Macmillan, Inc.
4300 West 62nd Street
Indianapolis, IN 46268
Phone: 317-298-5400

Mediagenic
3885 Bohannon Drive
Menlo Park, CA 94025
Phone: 415-329-0500

Microillusions
17408 Chatsworth St.
Granada Hills, CA 91344
Phone: 800-522-2041
or 818-360-3715

Mindscape Inc.
3444 Dundee Road
Northbrook, IL 60062
Phone: 312-480-7667

Okidata
5323 Fellowship Road
Mount Laurel, NJ 08054
Phone: 609-235-2600

Paragon Software
600 Rugh Street–Suite A
Greensburg, PA 15601
Phone: 412-838-1166

Pyxis Software
P.O. Box 18016
Colorado Springs,
CO 80935
Phone: 719-596-6465

Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
Phone: 415-964-1353



It's hard to negotiate the treacherous landscapes of **Battledroidz**, *especially as you try to monitor the complex control console at the same time.* *READER SERVICE NO. 245*

Featured This Month:

BATTLEDROIDZ
Datasoft/Intellicreations
Commodore 64
Disk; $24.95

BattleDroidz can best be described as *Marble Madness* with combat. Players manipulate a trio of warrior robots over a series of digital landscapes (called warzones) in this fast-moving and extremely challenging action-strategy contest.

The game begins with a grid display depicting 37 circular and color-coded warzones connected by short lines (much like a drawing of a molecular structure). The colors indicate the difficulty level for that warzone. The player selects a warzone and then chooses one of his three battledroids.

The droid is transported to the warzone where the actual action begins. The *Marble Madness*-style landscapes include hills, cliffs, acid lakes, and deadly pits. They are also patrolled by guardian Cyborites and offer a variety of strategic devices including Immobilizers (temporarily freeze Cyborites), Cyborite Generators, Smart Bombs (clear the screen of nasties), Ice Switches (cool out the acid lakes), Energy Keys (unlock the exit of each zone), Time Pistons (add or subtract from time remaining), and Telepads (transport the battledroid to another area of the zone).

The game's ultimate object is to conquer an unbroken chain of warzones by reaching and unlocking the exit to each. A conquered zone is indicated on the master grid by a series of horizontal lines within the circular zone-marker. An unsuccessful foray into a warzone results in a "blown" zone. These zones are marked with a series of dots on the master grid and are rendered useless as the player strives to connect a complete grid-length chain of conquered zones.

The three battledroids each exhibit specific virtues and weaknesses. The Fangdroid moves well but is vulnerable to the acid lakes. Hoverdroid is not so maneuverable, but since he travels off the ground he is not affected by the acid lakes. Balldroid is the most agile robot, but also the weakest and the hardest to steer.

Beneath the main visual display is the multifeature control panel which includes an energy bar (how much life is left in the droid), score, time remaining in minutes and seconds, bonus letters, Energy Key status, smart bomb availability, temperature gauge, and number of objects to find.

The player also has access to a Battle Map of his current location within a warzone. This provides a detailed overview of the area.

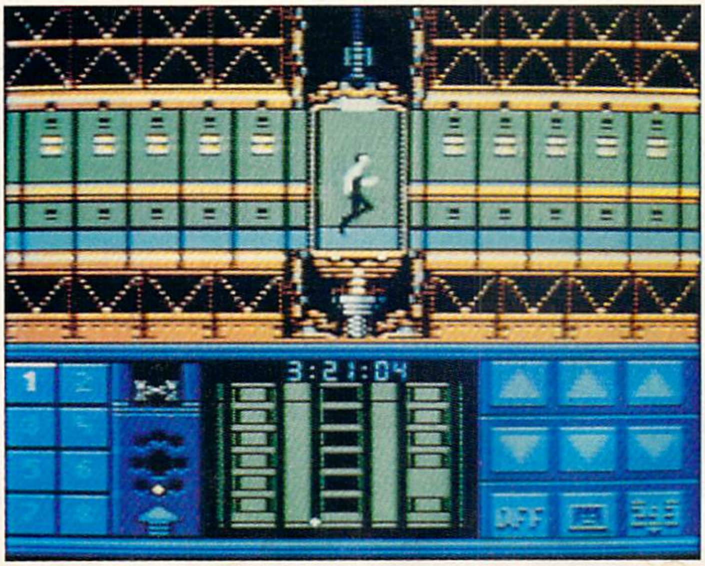
The visuals on *Battledroidz* are very impressive and, since we've mentioned it twice already, superior to the C-64 version of *Marble Madness.* The game uses the popular ⅔ perspective with action viewed from above and slightly to the side. The scrolling is very smooth and the color selection makes the action easy to follow.

But, this game is *hard.* It takes lots of practice to control even the easiest droid over these treacherous landscapes, and even more to simultaneously monitor the complex control console. It's worth the effort, however, since *Battledroidz* is a solid, entertaining program.

Intellicreations, 19808 Nordhoff Pl., Chatsworth, CA 91311 (phone: 818-886-5922). *—Bill Kunkel*

IMPOSSIBLE MISSION 2
Epyx
Commodore 64
Disk; $39.95

The original *Impossible Mission* was a watershed design in the history of computer games. Though not a big fi-



The graphics and animations of **Impossible Mission 2** *are almost identical to the original's—state of the art at that time, and still impressive.* *READER SERVICE NO. 241*

nancial success here in the United States, it was widely pirated and became the focus of tremendous cult affection. In England, however, it was the most influential game program ever, spawning hundreds of imitations in the half-decade since its release.

Impossible Mission cast the player as a futuristic detective attempting to penetrate the underground lair of arch-villain Elvin Atombender, to foil his plot to conquer the world. The search takes the player deep into the bowels of Elvin's sanctum sanctorum via high speed elevators which connect a series of rooms. The chambers contain everything from powerful computers and other high-tech paraphernalia to simple furniture and works of art. Secreted within these objects are the jigsaw puzzle pieces to the code which the player has been sent to retrieve.

Impossible Mission 2 is both a delight and a disappointment, for the same reason: it is little more than a duplicate of the original with one or two new wrinkles. On the other hand, it's hard to improve all that much on a classic design without losing the greatness of the original.

One cosmetic difference from the first release is the game's direction. Instead of moving down into an underground bunker, the object of *IM2's* search is Elvin's eight-tower complex "in Northwest Los Angeles near the UCLA campus." The player is randomly assigned to one of these towers and cannot gain access to these towers and cannot gain access to the others until breaking the security code. This requires locating passcode numbers hidden in the rooms, then assembling them via a handy-dandy pocket computer, much as the player put together the secret code in the original game.

IM2 does add a new element: the player must arrest Elvin himself by gaining access to his central tower. This can only be done with a musical passcode. The pieces of this tuneful tool are hidden in safes throughout the fortress complex.

As in the original game, Elvin took the precaution of stocking his hideout with guardian robots to protect his secrets. This mechanical security force includes six types of robots, ranging from stationary sentries to smart guards who can track down and fire "high voltage plasma bursts" at intruders.

Impossible Mission 2 also resembles its predecessor in the play mechanic employed to search objects, and the things these searches can reveal. To investigate an object, stand in front of it and push the joystick forward. A small window with a diminishing time line appears and, when the search period elapses, anything discovered appears in that same window and is added to the player's inventory. Items hidden in objects are passcode numbers, security terminal command icons, and time extensions. (The *IM* games use a time limit rather than a fixed number of lives.)

The player accesses Elvin's own computer terminals to use the security command icons. These icons reset the vertical and horizontal platforms, light up dark rooms, and temporarily deactivate robots. The terminals also provide access to any mine or time bomb icons the player uncovers. The time bombs are especially useful in blowing open the safes which contain the musical passcodes.

The graphics and animations are virtually identical to the original's (state-of-the-art at that time, they still look pretty darned impressive). Everything is viewed from a side perspective, the movement is smooth and objects nicely drawn, but the color scheme is a problem. The search windows are sometimes hard to see against the similarly colored backgrounds. There is also a reprise of the original game's excellent digitized audio effects, including the player's eerie death scream and the opening in which a Boris Karloff imitator representing Elvin invites us to "Stay a while...stay *forever!*"

Impossible Mission 2 is a worthy successor to the original, which was one of the true classics of computer gaming. And that is pretty substantial praise.

Epyx, 600 Galveston Dr., Redwood City, CA 94063 (phone: 415-366-0606).

—Bill Kunkel

STAR RANK BOXING II

Gamestar
Commodore 64
Disk; $29.95

A good working definition of "ambivalence" is the feeling which accompanies booting a new game which is a revision of a long-time favorite. Designers Craig Erickson and Brian Rice have updated and embellished the classic action-strategy boxing game, *Star Rank Boxing*, in an attempt to make a good program even better.

The pair have succeeded admirably, though even their judicious pruning of some elements may mildly irk the most ardent fans of the original Gamestar title. In particular, the detailed prebout training routine included in the earlier version is bound to be missed.

Training camp incorporates fewer variables, which makes preparation for the fight only a minor aspect of *Star Rank Boxing II.* How the fighter trains still affects stamina, speed, and strength, but the reduced number of choices makes it more difficult for a veteran manager to implement a conditioning strategy. On the other hand, it also makes it harder for a novice cornerman to unduly handicap a pugilist with an inferior workout regimen.

Once the bell rings for a one- or two-player bout, the new game's superiority over *Star Rank Boxing* becomes immediately obvious. It looks better on the screen and allows the computer to throw a wider array of punches.

Depending on how the manager manipulates the joystick and action button, a fighter can jab, hook, cross uppercut to the head, or pound the body. There are three defensive maneuvers: covering up, leaning, and ducking. Each counters one or more of the offensive moves. For example, a duck avoids a cross, while a lean wards off a body shot.

The fighters are drawn more attractively than in *Star Rank Boxing,* and the animation is exceptionally fluid. The improved graphics work beautifully with the expanded repertoire of blows and blocks to produce action sequences which really look like boxing. Computer music master Russell Lieblich has worked wonders with the sound and contributed a stirring musical score.

The computerist can create and save up to 15 fighters right on the game disk, five in each of the three weight classes. While it's possible to match heavyweights against middleweights and welterweights, the documentation wisely counsels players to think twice before taking on a heavier opponent.

Star Rank Boxing II offers both exhibition and tournament bouts. The for-

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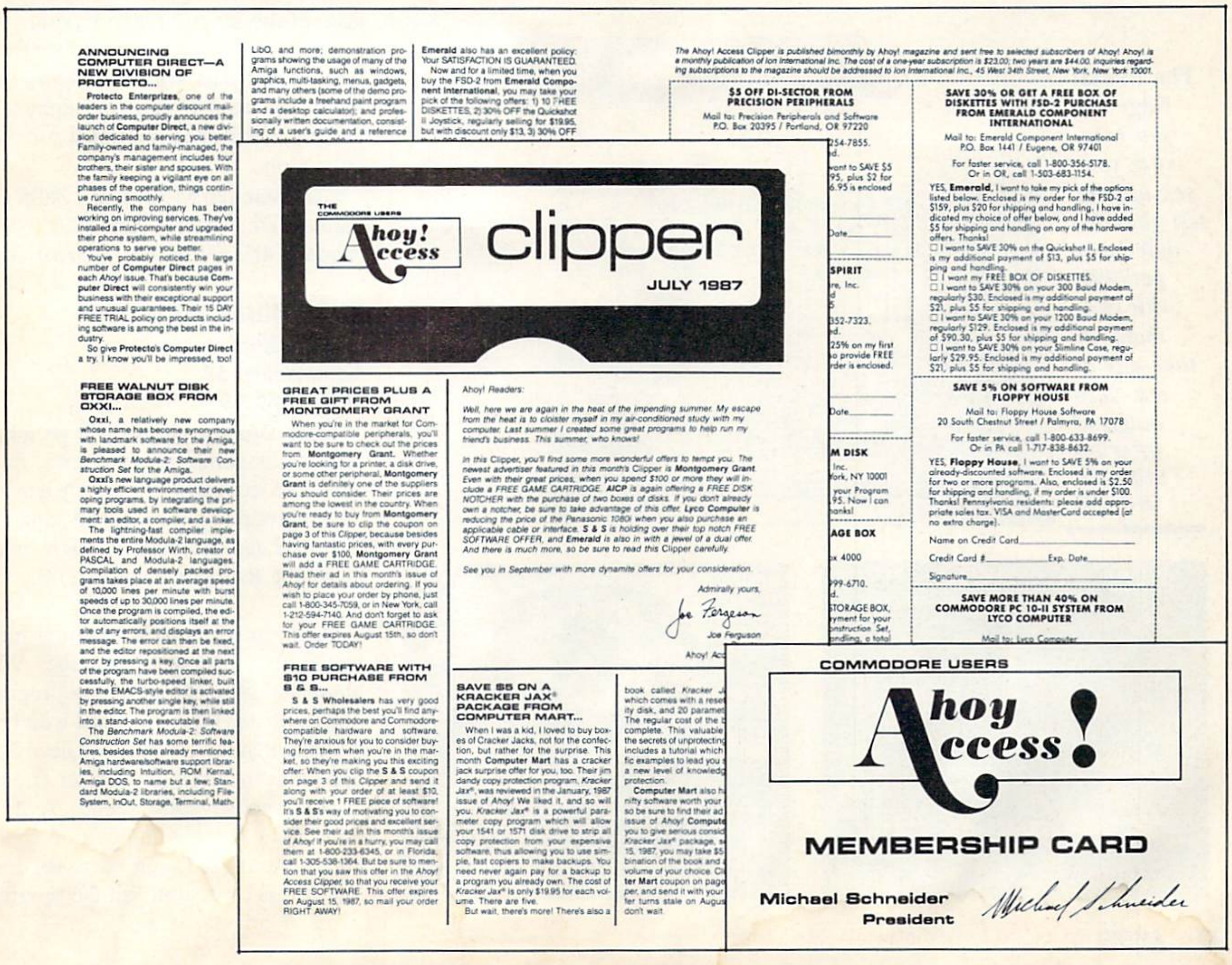
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mer are essentially practice bouts, while the results of the latter are automatically added to the fighter's permanent record and may affect his ranking as a contender.

In the tournament, the fighter must start at the bottom and win some bouts against less formidable contenders. Only after compiling a string of victories can a fighter gain enough extra strength and stamina to stand a chance against the champion in the squared circle. Boxers who lose too many decisions can be dropped and replaced by new men.

The joystick-operated control system produces significant hand fatigue after ten three-minute rounds. Since combinations of punches have more effect than isolated blows, players tend to jiggle the stick at a furious rate. Don't expect to play more than a couple of games of *Star Rank Boxing II* in a single session without suffering a few aches and pains.



Star Rank Boxing II *looks better on the screen than its predecessor, with more fluid animation, better rendered fighters, and a wider array of punches.* *READER SERVICE NO. 242*

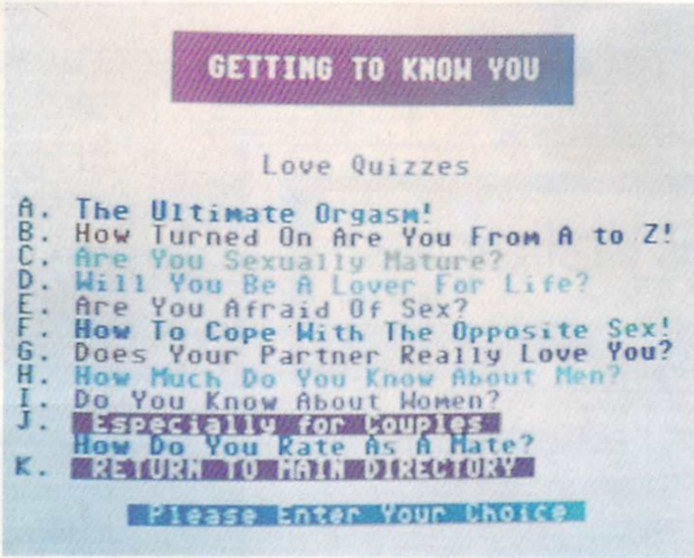
Judges score using the "10-point must" system. This awards 10 points to the fighter who captures the round and a lesser score to the opponent based on the disparity of performance.

Some managers will want to conserve energy, block and move a lot, and try to win by a decision. More aggressive players can pull out all the stops and try to put the other guy flat on the canvas.

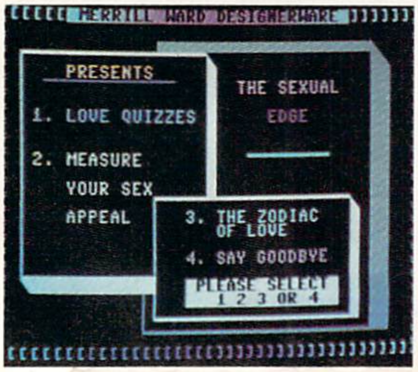
A pair of colored squares, located in the upper left and right corners of the playfield, monitor each competitor's current susceptibility to getting knocked down. A green square means a fighter is steady on his feet, but red signals the imminent possibility of a knockdown.

Star Rank Boxing II now represents state-of-the-art in arcade boxing programs for the Commodore. Even those who already own *Star Rank Boxing* will definitely want to add the enhanced version to their entertainment software collection.

Gamestar, c/o Mediagenic, 3885 Bohannon Dr., Menlo Park, CA 94025 (phone: 415-379-0800). *–Arnie Katz*



The Sexual Edge *lets you measure your sex appeal, test your zodiac compatibility with your mate, or take any of ten "love quizzes."* *READER SERVICE NO. 243*





THE SEXUAL EDGE
Merrill Ward
Commodore 64
Disk; $24.99

Even computerphobes will get a kick out of this compilation of tests, quizzes, and compatibility comparisons. Add a group of merry-makers, and *The Sexual Edge* provides enough entertainment to keep a party going for hours.

"Are you ready to have some fun?" is the first onscreen message. With abundant good humor, the program urges any nay-sayers forward with borrowed wit and wisdom: "We have days like that ourselves, but as our friends at Infocom so aptly stated, 'A dirty mind is a terrible thing to waste!' " Shelly Merrill & Diane Ward, the creators of this diversion, salt the program

PURE-STAT BASEBALL™



From **Software Simulations** comes an incredibly sophisticated, realistic, and complete statistical baseball simulation for zero, one or two players. Game play, manager's functions, graphics, and a complete statistical library establish Pure-Stat Baseball™ as the ultimate sports simulation program.

Suggested retail price

$39.95

Optional Team and Create Your Own Team Disks Available.

Available for C-64/128, Apple, IBM-PC

Game Play

Pure-Stat Baseball's underlying statistical framework simulates the realities of baseball like never before. Within this framework the program considers each player's batting statistics against both **LEFT**- and **RIGHT**-handed pitchers, where available, and pitchers stats vs. both **LEFT**- and **RIGHT**-handed batters. Every player's fielding and base-running abilities are also considered (an important factor when attempting to steal a base, etc.)

Select the team you'd like to manage, then pick the team you want to play against. Every team from the 1985 season is accurately represented, along with eight classic teams from the past. Determine your starting lineup, designate a starting pitcher, and make player substitutions when necessary. You call the plays, offense and defense. In a one-player game, your computer opponent displays un-canny intelligence in reacting to your managing decisions.

Manager's Functions

Built-in manager's functions provide extra versatility. The Trading function gives you the opportunity to create the "what if" team(s) you've always dreamed about. With this function you can have Dwight Gooden playing with Mickey Mantel and Babe Ruth. Or, if you like, you can form your own draft leagues from existing teams and play against your friends for your own pennant and World Series.

The Stat-Keeper function compiles all of the players' statistics for you and calculates Batting Averages and pitchers' ERAs. You can track your own teams' performances and print the season statistics for your club or league.

Stadium Disk

An optional Stadium Disk is also available that lets you play in any of the twenty-six Major League stadiums.

Statistics

Pure-Stat Baseball™ can maintain a complete statistical record of each team player's performance. You can print all of your players' year-to-date performance statistics at anytime throughout the season. All player stats and game Box Scores can be displayed on the screen or sent to an external printer for a hardcopy printout. The PRINT TEAM STATS function can be used at the end of the season to determine your Most Valuable Player, or to review your club's performance.

Pure-Stat Baseball™ also includes a unique Auto-Play option that lets the computer play a complete game in less than three minutes. A whole series of games can be played unattended, and an entire season of player and team statistics can be compiled over several days with all game stats printed out for your records.

Discover for yourself just how enjoyable a baseball simulation game can be. Pure-Stat Baseball,™ the first real baseball game on a computer.

See your local dealer, or call:

Software Simulations

959 Main Street, Stratford, CT 06497

203/377-4339

with such pithy pearls throughout. Each grain leavens the meat, to relieve what might otherwise be a ponderous, school-like format.

But format isn't the story on this program. It's a workmanlike presentation, but fancy graphics play no part. Questions are typed against a solid background, and the only real visual enhancement is the neonlike border around the title page. There is one plus: an unusually well performed music track (by Glenn Miller) enlivens the tests.

The main menu of *The Sexual Edge* offers three diversions, and the player just selects the number of the one preferred. No computer expertise is needed; even someone who has never touched a computer can follow the onscreen instructions.

"Measure Your Sex Appeal" seemed a good starting place. This is a simple test that asks the user how many items in a picture indicate sex appeal and romance. It's a silhouette of a couple sipping wine and gazing into each other's eyes. After studying the picture, the user checks the answer, which lists them and points out a couple of hard-to-spot items which indicate a high level of romance for anyone who saw them.

The Zodiac of Love lists the dates and signs of the zodiac and invites the user to enter his/her own sign and then a lover's sign. The readout on the match is a discussion of the four types, Earth, Fire, Air, and Water, and how they mingle. I input my own sign (Capricorn) and that of my July-born (Cancer) mate, for a resulting readout that described a mishmash of both disaster and stability. I was pleased to learn, on the one hand, that we "blend easily," but alarmed to know that "Earth might trap Water and keep it from its natural course, while Water can turn Earth into mudslides." Not much wiser than when I began, I returned to the main menu for a shot at the major entertainment on the disk, the quizzes.

The Love Quizzes are the real reason for *The Sexual Edge*. They were compiled by the program authors from a variety of sources. Some were written by the late Jane Sherrod Singer, M.A., Univ. of CA. Dr. Singer created hundreds of psychological quizzes for books and magazines. Others were written by Drs. Karen Markham and Lawrence Schwab, sexual researchers.

There are ten tests: The Ultimate Orgasm, How Turned On Are You, Are You Sexually Mature, Will You Be a Lover for Life, Are You Afraid of Sex, How to Cope with the Opposite Sex, Does Your Partner Really Love You, How Much Do You Know About Men, How Much Do You Know About Women, and (for couples) How Do You Rate As a Mate?

I decided to find out how well I know men. A series of true-false questions compared men's and women's criminality, driving skills, and other assorted facts. As I entered my guess in response to each question, it revealed the correct answer, with appropriate explanations. When I finished, the results indicated my level of expertise, then sent me back to the main menu.

"How Turned On Are You?" is meant to distinguish whether you're a prude or a "wild and open person." It asked me to rate my feelings on a scale of 1-6, ranging from "sickened and repulsed by the thought" to "I never tire of doing this." The 25 questions rate feelings on subjects ranging from group nudity to various sexual activities. It measured my responses, then said (as I had always suspected) that it is exciting for others just to be in the same room with me.

The couples test asks a series of questions of each person, and offers individual character analyses. Then a special combined report provides an evaluation of the compatibility of the two people.

Almost everyone likes self-analysis quizzes, and *The Sexual Edge* takes away the labor of scorekeeping. Each quiz has from 4 to 6 categories of analytical response, and there's enough variety of subject matter to keep the program entertaining for a long time.

The tests, like most similar self-help quizzes, are just meaty enough to add a dimension of seriousness. But the result is an entertaining mixture of slightly titillating material that's bound to be fun for everyone.

Merrill Ward, 255 N. El Cielo Rd., Suite 222, Palm Springs, CA 92262 (phone: 619-328-8728).

—Joyce Worley

FLOTSAM

We welcome letters on any aspect of Commodore computing, or anything else under the sun. Write to *Flotsam*, c/o *Ahoy!*, Ion International Inc., 45 West 34th Street–Suite 500, New York, NY 10001.

Our review of Landmark, The Computer Reference Bible *(June '88* Ahoy!*) resulted in hordes of angry letters being visited upon us from the program's devoted users. We'll let Rick Pavy, manufacturer of the program, lead the charge:*

Thank you for the time you took to speak to me concerning the June 1988 review of *Landmark TCRB.* I deeply appreciate the opportunity you gave me to respond to the review in this letter.

I find it hard to believe that the reviewer spent much time with the program. He missed the entire purpose of the program, and used *Landmark TCRB* in a way it was never intended to be used–for reading the Bible from his monitor screen.

Landmark TCRB is a Bible study tool which is used to *supplement* your normal Bible study. The purpose and intent of the program is threefold:

1) To conduct searches of the Bible for words, phrases, and sentences by using the Search Accessory. The reviewer apparently never saw the Search Accessory.

2) To create Topical Files covering any subject the user may be studying. Scripture and search results may be copied, comments may be added, and the file may be saved to disk. Any file made with *Landmark TCRB* can also be converted to be used with many other programs, to add graphics or different fonts. Many pastors, ministers, etc. use the program to prepare sermons, and many laypeople have contacted us regarding making their own files to help in their Bible Study.

3) To keep your own Personal Bible, by outlining text in color (not underlining, as stated in the review) and even adding a note about why something was outlined. Notes and comments may be added either directly to the Bible text, or to the individual verse references, thus making your notes reference specific verses. You can add to the existing references, or create new references, and even reference your own files. Translation variations may be added, and supplemental study files created. This is a way to keep all Bible study organized, on permanent record, and easily printed.

A speed loading DOS was intentionally left out of the program, as it would void any fast loading cartridge or software the user might have; plus, it would not be compatible with all disk drives. The C-64 version of *Landmark TCRB* works very well with fast loading cartridges, and the C-128 version uses the Fast Serial Mode of the 1571 during regular loads, and the burst mode during searches. The program is also drive transportable. The entire program can be copied to 3½" disks (total of eight disks) to be used with the 1581 disk drive, or copied to a hard disk drive. Parallel disk drives such as the 1+ MB SD1001 can also be used with the program. The faster speed of any drive used is *fully utilized.*

Each Area of *Landmark TCRB* consists of 450 lines (C-64) or 500 lines (C-128), and two Areas may be saved into one file, for a total of 900-1000 lines per file–more lines than some word processors, and very sufficient for the uses of this program. It has been 4½ years since this program began development. We have spent much hard work developing the program, besides just typing and checking (7 times) the Bible text itself. The program is indeed 100% machine language, not including the BOOT program which starts the program loading.

The basic physical description of the program is also in error. Two versions of *Landmark TCRB* are available. The C-64 version is v1.2 (not 2.0 as stated) and the C-128/1571 version is v2.0. Both versions consist of 1 program disk, 24 double-sided Bible text disks (not 23 single sided disks as stated), and 6 double-sided concordance disks.

There are too many errors in the review to suggest that the reviewer knew enough about the basics of the program, or its intent, to give a fair and honest review. *Landmark TCRB* is an extensive program, and it would take quite a while to thoroughly cover all its features and uses. A newsletter has also been recently started (by one of our customers) through which tips and suggestions on using the program may be shared.

I do not mean to criticize the staff of *Ahoy!* Mr. Allikas has been most kind, helpful, and easy to contact, and he listens and acts on any problems. I am also grateful to *Ahoy!* for publishing the first mention of *Landmark TCRB* in any magazine in their December 1986 issue.

A personal note to Mr. Blakemore: eight years of Bible study is commendable, but is a very short time. I had eight years of Bible study under my belt over ten years ago, and am still going strong, although I would *not* pretend to be an expert in the Bible, or in any use of it. One verse I wish you would have viewed (while reading the Bible from your screen) is Ecclesiastes 9:10–*Whatsoever your hand findeth to do, do it with thy might.*

I would have expected much, much more from a reviewer of your supposed status.

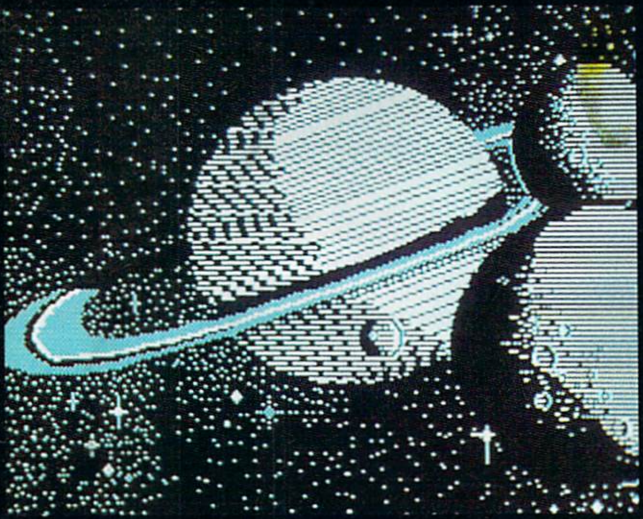
–N. Rick Pavy
President, P.A.V.Y. Software

Several readers wrote in to support Rick along these and other lines. Says George Huckabay of Livermore, CA, a Bible student for 50 years and a computer user for 25: "...I have enjoyed Cleve's type-in programs for the C-128...and I respect Cleve's clever mind very much, but he missed the boat completely.... It possible for Bible students to 'prove' any preconceived idea by finding an isolated passage in the Scripture, but by using the "string search" feature of *Landmark* to list all occurrences of a given expression...a much clearer picture of the true meaning emerges."

Keith Olson, pastor of the Trinity United Methodist Church in Crawfordsville, IN, adds: "The set of disks is

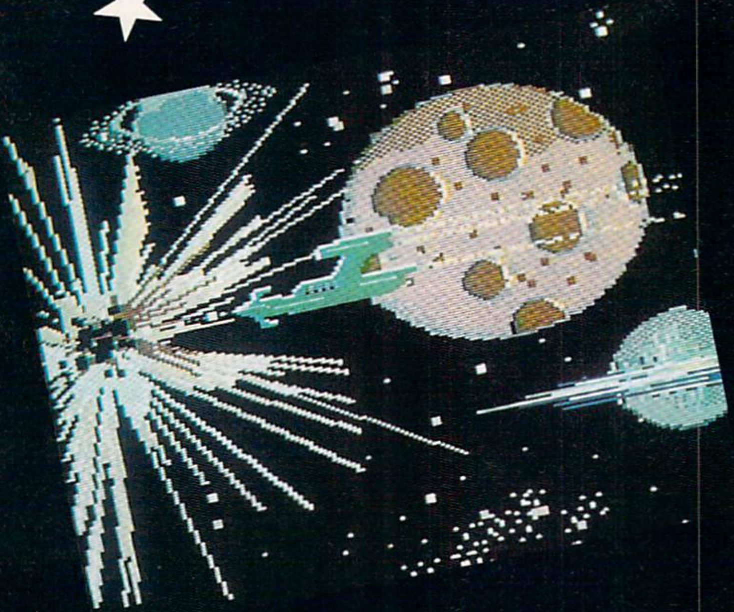
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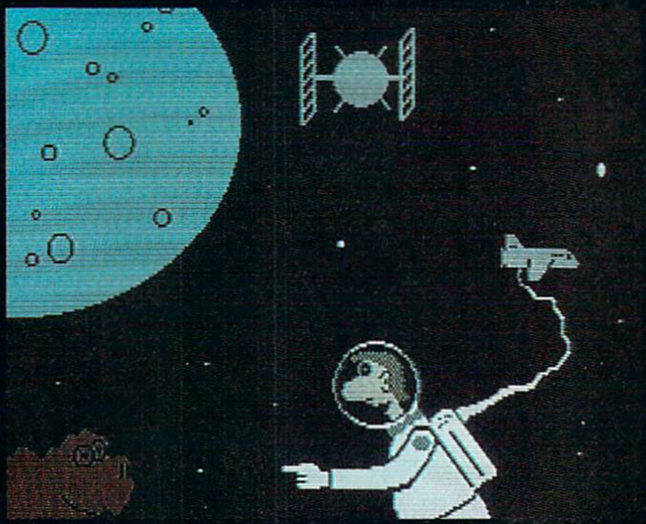
ART GALLERY

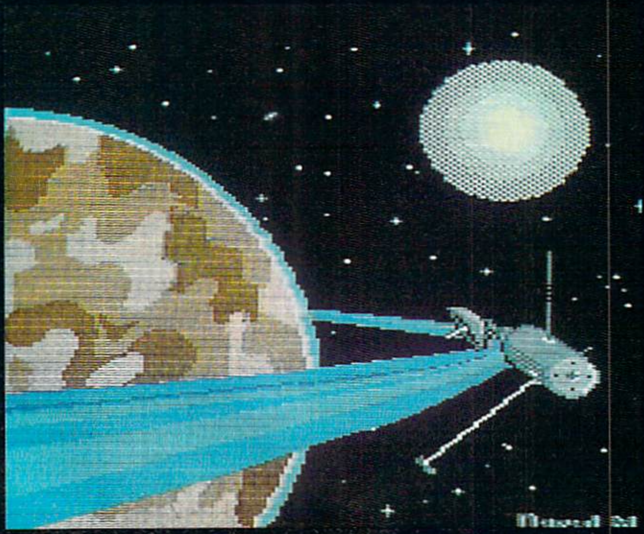


The *Art Gallery* offers the opportunity for fame and fortune to aspiring Commodore artists. Send your work on disk to *Art Gallery,* Ion International Inc., 45 West 34th Street–Suite 500, New York, NY 10001. Indicate the drawing package or file format of the images. Graphics produced on the Amiga are eligible for inclusion in *Ahoy!'s AmigaUser;* C-64, C-128, and Plus/4 images are eligible for inclusion in *Ahoy!* If your image is published, you will receive a free one-year subscription. Current subscribers will have their subscription extended by one year.

Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the Art Director, based solely on their artistic merit.







Our spacecraft-crazy contributors never tire of showing us their latest preproduction designs—or we of admiring them. Left: *Space Battle* by Heinz Diekert (Vernon, BC), atop *Satellite* by Daryl Maksymec (Regina, Sask.), both drawn on *Koala.* Above: *Saturn Moon* by David Grabowski (No. Myrtle Beach, SC) and *Spacewalk* by Jeff DeVries (Bigrapids, MI), a pair of *DOODLE!s.* Come on, Boeing—get cracking on some of these before the Japanese do!

TIPS AHOY!

Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* will be compensated at competitive industry rates. Send your best programming and hardware hints for the C-64, C-128, or Amiga (send longer routines on disk, please) to *Tips Ahoy!*, 45 West 34th Street–Suite 500, New York, NY 10001. Include a stamped and self-addressed return envelope if you want your submission returned.

FILE SLICER

This short BASIC program for the 64, 128, Plus/4, or 16 is a must if you find yourself with a sequential text file which is too large to fit into available memory. The problem may develop when going from one word processor/computer to another.

File Slicer will ask for the name of the file which is too large, a name for the new files (the program appends .A, .B, etc. to the name of the new file as needed), and the number of blocks per file (disk blocks rounded to 254 characters each).

Make sure the file to be shortened (sliced) is in the drive and enough disk space is available before running the program. –Shawn K. Smith
Bronx, NY

```
•100 REM* FILE SLICER  BY SHAWN K. SMITH
•110 OPEN1,8,15:R$=CHR$(18)
•120 PRINT"[CLEAR][4"[DOWN]"]"
•130 PRINT:INPUT"NAME OF FILE TO SPLIP";S
N$:IFSN$=""THENCLOSE1:END
•140 OPEN8,8,8,+SN$:GOSUB260:CLOSE8
•150 PRINT:INPUT"NAME OF NEW FILE";NF$
•160 IFLEN(NF$)>14THENPRINT:PRINTR$"14 CH
ARACTERS MAX.":GOTO150
•170 PRINT:INPUT"HOW MANY BLOCKS PER FILE
";BF$
•180 BF=VAL(BF$):IFBF=0THENCLOSE1:END
•190 PRINT:OPEN8,8,8,+SN$:GOSUB260
•200 OPEN9,8,9,+NF$+"."+CHR$(VN+65)+",S,W
":GOSUB260
•210 PRINT"WRITING "+NF$+"."+CHR$(VN+65)
•220 FORD=1TO254*BF
•230 GET#8,A$:IFST<>0THENCLOSE8:CLOSE9:CL
OSE1:PRINT"FINISHED!":END
•240 PRINT#9,A$;:NEXT:CLOSE9
•250 VN=VN+1:GOTO200: REM NEXT SLICE
•260 INPUT#1,E,E1$,E2$,E3$:IFE=0THENRETUR
N
•270 PRINT:PRINTR$E;E1$,E2$" ";E3$:CLOSE9
:CLOSE8:CLOSE1:END
```

NORTH BY SOUTH

Here's another way to clear your screen in a nifty fashion. *North by South* does just what its name implies. The bottom half heads south while the top half drifts north.

You can append it to your own programs and have them GOSUB to it to get the data into memory. Just add line 63007 with a RETURN:

```
63007 RETURN
```

Whenever you want some action, have your program SYS 53000 and the screen will clear *North by South.*

You can relocate *North by South* by changing the variable A in line 63000.

For a quick demonstration, load and run *North by South*. Now list it to get the screen filled. Type SYS 53000, press RETURN, and watch 'er go. –Buck Childress
Salem, OR

```
•63000 A=53000
•63002 PRINTCHR$(147)"LOADING DATA ";
•63004 FORJ=ATOA+122:READB:POKEJ,B:X=X+B:
PRINT"*";:NEXTJ
•63006 IFX<>18480THENPRINT:PRINT:PRINT"ER
ROR IN DATA[3"."]":END
•63008 DATA169,12,133,2,169,7,162,219,160
,191,133,252
•63010 DATA134,254,132,251,132,253,160,0,
177,251,160,40
•63012 DATA145,251,160,0,169,32,145,251,1
77,253,160,40
•63014 DATA145,253,165,251,208,2,198,252,
198,251,165,253
•63016 DATA208,2,198,254,198,253,165,252,
201,5,208,214
•63018 DATA169,4,162,0,160,216,133,140,13
4,139,134,141
•63020 DATA132,142,160,40,177,139,160,0,1
45,139,160,40
•63022 DATA169,32,145,139,177,141,160,0,1
45,141,230,139
•63024 DATA208,2,230,140,230,141,208,2,23
0,142,165,139
•63026 DATA201,216,208,218,165,140,201,5,
208,212,198,2
•63028 DATA16,138,96
```

SCREEN FLASH

This short program will generate characters of various colors on the text screen. By increasing the speed of the internal clock (56325, 1), the randomly flashing characters and colors create a unique display.

For a variation, try changing the second number in line 16 to 0. (In doing this you must also change the CK< >6273 in line 12 to CK< >6272.)

Hit RUN STOP/RESTORE to exit. –Steven Shearer
Harrisburg, PA

```
•5 CK=0
•10 FOR B=49152 TO 49208:READ A:CK=CK+A:P
OKEB,A:NEXT
•12 IF CK<>6273 THEN PRINT"ERROR IN DATA"
:END
•14 SYS 49152
•16 DATA 169,1,141,5,220,160,0,173,162,0,
153,0,4,153,0,5,153,0,6,153,0,7,200,208
•18 DATA 238,160,0,173,162,0,153,0,216,15
3,0,217,153,0,218,153,0,219,200,208,238
•20 DATA 169,0,141,33,208,141,32,208,76,0
,192,139
```

REVERSE

In our continued quest for ways to spruce up title and menu screens, here's one more to add to your collection. *Reverse* automatically and continually reverses and unreverses your screen until you press a key. It adds a nice touch to an otherwise steady display. There are versions for both the C-64 and C-128.

You can append it to your own programs and have them GOSUB to it to get the data into memory. Just add line 63005 with a RETURN:

```
63005 RETURN
```

Whenever you want some reverse action, have your program SYS 53000 for the C-64, or SYS 3864 for the C-128, and the screen will begin its reversing act. Press a key to halt it. By the way, *Reverse* always returns the screen to its non-reversed status.

You can relocate *Reverse* by changing the variable A in line 63000.

For a quick demonstration, load and run *Reverse*. Now list it to get the screen filled. Type SYS 53000 (4864 for the C-128), press RETURN, and watch it flash.

—Buck Childress
Salem, OR

C-64 VERSION

```
•63000 A=53000:REM (FOR THE C-64)
•63002 FORJ=ATOA+76:READB:POKEJ,B:X=X+B:N
EXT
•63004 IFX<>9887THENPRINT"ERROR IN DATA[3
"."]":END
•63006 DATA169,0,133,251,133,252,162,0,18
9,0,4,73
•63008 DATA128,157,0,4,189,0,5,73,128,157
,0,5
•63010 DATA189,0,6,73,128,157,0,6,189,0,7
,73
•63012 DATA128,157,0,7,232,208,221,165,25
1,73,128,133
•63014 DATA251,160,0,232,208,253,200,208,
250,165,252,208
•63016 DATA11,32,228,255,240,196,133,252,
165,251,208,190
•63018 DATA169,0,133,198,96
```

C-128 VERSION

```
•63000 A=4864:REM (FOR THE C-128)
•63002 FORJ=ATOA+78:READB:POKEJ,B:X=X+B:N
EXT
•63004 IFX<>10239THENPRINT"ERROR IN DATA[
3"."]":END
•63006 DATA169,0,133,251,133,252,162,0,18
9,0,4,73
•63008 DATA128,157,0,4,189,0,5,73,128,157
,0,5
•63010 DATA189,0,6,73,128,157,0,6,189,0,7
,73
•63012 DATA128,157,0,7,232,208,221,165,25
1,73,128,133
•63014 DATA251,160,0,232,208,253,200,208,
250,165,252,208
•63016 DATA11,32,228,255,240,196,133,252,
165,251,208,190
•63018 DATA169,0,133,208,133,209,96
```

PRIMES REVISITED

Periodically I scan through my magazine collection in search of programming tricks which might prove useful in my own programs. This time, though, I happened to notice in the June '87 *Tips Ahoy!*, on page 72, an entry by Mr. Henry F. Smith on Prime Numbers. Although written to utilize the C-128 FAST command, this can be emulated on the C-64 using the Dec. '86 contribution to *Tips Ahoy!* by Mark Bersalona, on page 107 of that issue.

Making the necessary changes, I ran the C-64 version against Mr. Smith's benchmark, the first prime after 99,999,000. Close to 10 minutes later my 64 gave the right answer, but 10 minutes was rather trying on my patience.

At this point, I took a good hard look at the math in Mr. Smith's program and soon realized that he didn't really know much about prime numbers.

Rule 1: A prime can only be divided evenly by itself and 1.

Rule 2: A prime larger than 2 can only be an odd number.

Rule 3: A prime larger than 5 can only end in 1, 3, 7, or 9.

Rule 4: A prime candidate which passes the first 3 tests can only fail at this point if it can be divided by a prime less than half its own size, or alternately, by a number which passes the same tests but is less than half the value of the number under test.

How do these rules apply to Mr. Smith's program? First, he generates all numbers within a given range for testing—only odd numbers need be generated. Second, he tests these numbers with all numbers in a lesser range as divisors—again only odd numbers need be generated.

In short, the following program will generate 9 digit primes on a C-64 in less time than Mr. Smith's program will generate 8 digit ones on a C-128.

How fast this program will run on a 128 is up to others to determine, since I don't have one handy. But the following changes are all that should be necessary.

```
85 FAST

180 SLOW
```

—Rev. R.L. Anderson
Phoenix, AZ

```
•10 REM ** PRIMES REVISITED
•12 REM ** BY REV. R. L. ANDERSON
•14 REM ***************************
•20 PRINT"[CLEAR][3"[DOWN]"]THIS IS A PRI
 ME NUMBER GENERATOR"
•30 PRINT"[DOWN][DOWN]IT IS ALREADY KNOWN
  THAT 1, 2, 3, AND 5 ARE PRIMES"
•40 PRINT"[DOWN]SEED NUMBERS ARE ALLOWABL
 E IN THE RANGE 5 TO (10[UPARROW]10)-1"
•50 INPUT"[DOWN][DOWN]SEED NUMBER";S
•60 IF S<5 OR S>(10[UPARROW]10)-1 THEN 20
•70 IF VAL(RIGHT$(STR$(S),1))AND1THEN85
•80 S=S+1
•85 POKE53265,0:POKE56325,255
•120 A=3:B=INT(SQR(S))
•130 IF A>B THEN 180
•150 C=S/A:IF INT(C)=C THEN170
•160 A=A+2:GOTO 130
•170 A=0:B=0:C=0:S=S+2:GOTO 85
•180 POKE53265,27:POKE 56325,46
•190 PRINT,,S
•200 GOTO 170
```

SWIFT LINE

Did more hair just fall out, or are those my fingers lying on the computer?!

While in the midst of a recent marathon session with the C-64, I looked at my paws just to be sure my pinkies were still attached. Fatigue had them in its grip and, what's more, they began to resemble something along the lines of link sausages. I quickly decided to switch off Ol' Reliable and take a break. Slowly the sausage links turned back into fingers. While the metamorphosis was taking place, I pondered various ways to save wear and tear on those important appendages of the paw. Try as I might, I couldn't get past one overwhelming fact—the keys have to be pressed. Well, if that's the case, let's press them as little as possible.

Swift Line automatically prints line numbers each time you press RETURN. It's easy to use. Here's how.

Run *Swift Line* to get the data into memory. To activate it, type SYS 53000 and then press RETURN. You can relocate it if you want by changing the variable A in line 1.

Whenever you press RETURN, a line number greets you. *Swift Line* continually monitors the last line number of the program in memory. When you press RETURN, *Swift Line* adds the increment and prints the sum. (What'd he say?!) As an example, suppose the last line number in your program is 990. The next number *Swift Line* would print, using the default increment of 10, is 1000. Even if you load a different program into memory, *Swift Line* automatically knows what the last line number is. If there is no program in memory, *Swift Line* starts numbering from the beginning.

The increment can be changed by POKEing location 2 with your choice. *Swift Line* accepts increments from 1 to 255. POKE2,50 would increment line numbers by 50.

To deactivate *Swift Line*, press RETURN without entering anything on the line. SYS 53000 (or wherever you've loaded it) reactivates it.

Try *Swift Line*. Your fingers will love you for it.

—Buck Childress
Salem, OR

```
•1 A=53000:PRINTCHR$(147)"LOADING";
•2 FORJ=ATOA+159:READB:POKEJ,B:X=X+B:PRIN
 T".";:NEXTJ:PRINT:PRINT
•3 IFX<>21393THENPRINT"ERROR IN DATA[3"."
 ]":END
•4 C=INT(A/256):D=(A-(C*256))+23:POKEA+11
 ,D:POKEA+13,C
•5 PRINT"DATA OK * SYS"A"TO ACTIVATE[3"."
 ]":END
•6 DATA104,104,165,2,208,4,169,10,133,2,1
 69,31
•7 DATA162,207,141,2,3,142,3,3,76,116,164
 ,160
•8 DATA3,177,43,133,253,136,177,43,133,25
 4,136,177
•9 DATA43,170,240,32,136,177,43,133,251,1
 34,252,160
•10 DATA1,177,251,240,23,170,160,3,177,25
 1,133,253
•11 DATA136,177,251,133,254,136,136,177,2
 51,184,80,227
•12 DATA134,253,134,254,165,254,24,101,2,
 197,2,176
•13 DATA2,230,253,170,165,253,133,98,134,
 99,162,144
•14 DATA56,32,73,188,32,221,189,162,0,189
 ,1,1
•15 DATA240,9,32,210,255,157,0,2,232,208,
 242,134
•16 DATA251,32,18,225,201,13,208,11,228,2
 51,208,7
•17 DATA169,131,162,164,184,80,131,32,101
 ,165,134,122
•18 DATA132,123,32,115,0,170,240,223,162,
 255,134,58
•19 DATA24,76,156,164
```

LO-RES PLOT

If you've ever looked closely at the Commodore character set you've probably noticed that it has a block graphics set consisting of 2 x 2 two cells. Plotting pixels using these quarter-block cells would give a screen resolution of 80 x 50 pixels (4000 pixels total), perfect for low resolution graphics. Because the block graphics set is part of the normal character set, the pixels can be plotted on a normal text screen.

The program below is for the Commodore 128 and loads a set of machine language routines that allows you to plot, erase, and read the status of pixels on the text screen. When plotting a pixel, you must send a color number (0 through 15), the x coordinate (0 through 79), and the y coordinate (0 through 49). To turn a pixel off, just call the routine with the x and y coordinates. To tell if a pixel is set or not

set, call the read pixel routine with the x and y coordinates and PEEK location 5047. If it is equal to one, then the pixel is set. Otherwise, the pixel is not set.

Once the routines are loaded into memory, you must call them using the SYS command. For example, you can draw a diagonal line in color 2 (red) by using this FOR loop:

```
FOR I=0 TO 30:SYS 4864,2,I,I:NEXT I
```

—Mike Hoyt
Richardson, TX

```
•10 SCNCLR:FOR I=4864 TO 5046:READ J:POKE
 I,J:K=K+J:NEXT
•20 IF K<>21350 THEN PRINT"ERROR IN DATA
STATEMENTS!":END
•30 PRINT"LO-RES ROUTINES INSTALLED."
•40 PRINT:PRINT"FORMAT: SYS 4864,COLOR,X,
Y - PLOT"
•50 PRINTTAB(8)"SYS 4879,,X,Y[6" "]-ERASE
"
•60 PRINTTAB(8)"SYS 4922,,X,Y[6" "]-READ
PIXEL"
•70 PRINT:PRINTTAB(8)"PEEK(5047)=1 IF SET
":PRINTTAB(18)"=0 IF NOT SET"
•80 DATA 141,183,19,32,77,19,152,13
•90 DATA 184,19,162,0,76,32,19,32
•100 DATA 77,19,173,184,19,73,255,141
•110 DATA 184,19,152,45,184,19,162,1
•120 DATA 168,185,167,19,160,0,145,187
•130 DATA 224,0,240,1,96,24,165,188
•140 DATA 105,212,133,188,173,183,19,145
•150 DATA 187,96,169,0,141,183,19,32
•160 DATA 77,19,152,45,184,19,208,1
•170 DATA 96,238,183,19,96,152,74,141
•180 DATA 186,19,169,8,176,2,74,74
•190 DATA 141,184,19,138,74,141,185,19
•200 DATA 173,184,19,176,1,74,141,184
•210 DATA 19,32,125,19,160,0,177,187
•220 DATA 160,15,217,167,19,240,5,136
•230 DATA 16,248,160,0,96,169,4,133
•240 DATA 188,169,0,133,187,172,186,19
•250 DATA 192,1,144,15,24,165,187,105
•260 DATA 40,133,187,144,3,230,188,24
•270 DATA 136,208,241,165,187,109,185,19
•280 DATA 133,187,144,2,230,188,96,32
•290 DATA 126,124,226,123,97,255,236,108
•300 DATA 127,225,251,98,252,254,160
```

C-64 ASCII/SCREEN CODE CONVERTER

The following relocatable routine will let you change instantly any string from ASCII codes to screen codes or from screen codes to ASCII. This is extremely useful when POKEing strings to the screen or when reading the screen to a string variable (as in screen dumps, for example). The routine will convert any string, of any length. To locate the routine elsewhere in memory, simply change the value of SA to the new start address.

The routine is simple to use. Just enter SYS SA,string variable, to convert ASCII to screen codes, or SYS SA+3, string variable, to convert screen codes to ASCII. Using a numeric variable will return a TYPE MISMATCH ERROR. If you don't include the variable, a SYNTAX ERROR will occur.

—Peter M.L. Lottrup
Buenos Aires, Argentina

```
•5 SA=828
•10 FORI=SATOSA+107:READX:POKEI,X:CK=CK+X
 :NEXT
•20 IFCK<>11406THENPRINT"ERROR IN DATA":S
TOP
•30 PRINTCHR$(147)"SYS"SA",VAR  (ASCII TO
 SCREEN)"
•40 PRINT"SYS"SA+3",VAR  (SCREEN TO ASCII
)"
•828 DATA 169,0,44,169,1,133
•834 DATA 2,32,115,0,32,139
•840 DATA 176,165,13,208,5,162
•846 DATA 22,108,0,3,160,0
•852 DATA 177,71,240,44,170,200
•858 DATA 177,71,133,251,200,177
•864 DATA 71,133,252,200,138,168
•870 DATA 136,165,2,208,26,177
•876 DATA 251,72,41,128,133,2
•882 DATA 104,41,63,72,165,2
•888 DATA 240,4,104,9,64,44
•894 DATA 104,145,251,136,16,231
•900 DATA 96,177,251,72,41,64
•906 DATA 133,2,104,41,63,201
•912 DATA 32,176,2,9,64,72
•918 DATA 165,2,201,64,208,4
•924 DATA 104,9,128,44,104,145
•930 DATA 251,136,16,223,96,39
```

COLOR FAST

Good ol' RUN STOP/RESTORE. It sure corrals a lot of runaway programs. There's just one problem with it. The colors always return to their default settings. If you're like me, you have favorite colors you program with. Now you've got to reset them—or at least you did. *Color Fast* retains your chosen colors no matter how many times you hit RUN STOP/RESTORE.

After saving a copy of *Color Fast,* run it. The loader POKEs the machine language data into memory and checks for errors. When it's done, set your screen, border, and cursor colors to whatever you want. Now activate *Color Fast* by typing SYS 50000, then press RETURN.

Pop RUN STOP/RESTORE a few times. Presto...no color changes! Rest assured that all other RUN STOP/RESTORE functions are working properly, though.

To deactivate *Color Fast*, SYS 50000 again. The first switches it on, the second switches it off, etc. Little messages let you know whether it's on or off.

Remember, colors can only be set when *Color Fast* is OFF. Turning it on corrals them till you switch it off. Enjoy!

—Buck Childress
Salem, OR

Continued on page 48

Variegated COMALs — From C-64 To ... Amiga?

By Richard Herring

Undoubtedly, there are fewer copies of COMAL in the world of computerdom than there are of BASIC. Yet COMAL proves its versatility in at least two ways other than the power and ease of the language.

First, COMAL has a broad base. I have used, or at least read about, COMAL running on Commodore computers, from PET to C-128, on IBM compatibles, on Acorns, and on a VAX minicomputer. COMAL runs under several common operating systems including CP/M, CP/M-86 (an alternative to MS-DOS), and UNIX. Each of those offers COMAL a wide variety of computers to run on. Finally, COMAL versions are being developed for a number of other computers including Apple and Amiga. We'll come back to that and I'll show you how to run COMAL on an Amiga today.

Second, COMAL is consistent. If you have programmed in BASIC and then moved to another computer, you know how inconsistent a language can be. Different versions of BASIC use different commands and different syntax for the most common functions.

COMAL avoids that kind of disconcerting panoply of changes by adopting some rules for uniformity. That set of rules is typically called the full COMAL Kernal or the Common COMAL Standard. Both those terms mean even more ease of use for you and me.

Once or twice a year, COMAL gurus from around the world meet and work toward keeping all the varieties of COMAL as compatible as possible. The core group of commands available in every version of COMAL is kept identical: the same commands, the same syntax.

Variation is allowed only where it is a function of the different operating systems or hardware. IBM compatibles, for instance, allow only 11 characters for filenames. Commodore 64's and 128s, of course, allow longer filenames that can be really descriptive of file contents. The maximum number of files that can be open at once also varies among computers, as does graphics and sound capability. Rather than cripple every version to the lowest common denominator, the Common COMAL Standard allows for these variations in one of two ways.

Small variations, like filename length, will be allowed to exist among different versions of COMAL. Bigger differences, like graphics (including sprites) and sound are usually put into extensions to the Kernal. Extensions, when a specific computer can support them, are then kept as uniform as possible. Graphics commands on an IBM and a C-64 should look alike, except for machine-dependent capabilities like IBM's lack of support for sprites. According to the COMAL literature, a graphics Kernal extension is one of the major areas under development.

Whenever a new "standard" is proposed for COMAL, general agreement must be reached among the gurus of the different versions or no change will be made. An example of the kind of detail they have considered recently is whether to allow a simple statement like "a(,):=1" to assign each element of an array the same value. (As reported by Brian Granger's "COMAL Standards Meeting" in *COMAL Today* #15.)

Beyond common keywords and the same programming structures, COMAL versions are even supposed to have a similar "look and feel." What does this mean for you and me? As I have experimented recently with IBM and CP/M COMALs, I find that most of my non-graphic programs for the C-64 work just fine after a mere handful of simple alterations. If you change computers, you can take your programs with you. The same holds true for moving from a C-64 to a C-128 and perhaps even to an Amiga. If your best friend programs in BASIC, you will not be able to swap your COMAL programs with him, but if he programs in COMAL on a different brand of computer, you probably will.

For the C-64, you can choose between two COMAL versions—the 0.14 disk and the 2.0 cartridge. The disk version is really an introductory COMAL and is not a complete implementation of the full COMAL Kernal. But it's not far off. Other than LOOP, an error handler, nested procedures or functions, IMPORTed variables, and PAGE, everything else you'll need is there. It is certainly suitable for beginning and intermediate level programmers.

The C-64 cartridge version does meet the Common COMAL Standard and includes nearly a dozen additional packages (machine language sets of commands that can be attached or loaded into COMAL or LINKed to a program). It supports nearly every feature offered by C-64 hardware, including commands for peripherals like joysticks, paddles,

TECH NOTES

1) Comparing the C-64 COMAL 2.01 cartridge, the C-128 COMAL 2.02 cartridge, CP/M COMAL 2.1, and IBM PC Mytech COMAL, you can expect the following keywords to be identical:

abs	dim	exit	mod	return
and	dir	exp	mount	run
append	discard	external	new	save
at	div	false	next	scan
atn	do	file	not	sgn
auto	edit	find	null	sin
basic	elif	for	of	size
bitand	else	func	open	spc$
bitor	end	get$	or	sqr
bitxor	endcase	goto	ord	step
bye	endfor	handler	otherwise	stop
case	endfunc	if	page	str$
cat	endif	import	pi	tan
chain	endloop	in	print	then
chr$	endproc	input	proc	to
close	endtrap	int	random	trap
closed	endwhile	key$	randomize	true
con	enter	len	read	until
cos	eod	let	ref	using
create	eof	link	rename	val
cursor	err	load	renum	when
data	errtext$	log	repeat	while
del	esc	loop	report	write
delete	exec	merge	restore	

And the following keywords will be available, but with a slight syntax difference or in a package: display, label, list, rnd, select output, tab, unit$ (chdir), use, and zone. Of these four versions of COMAL, only Mytech does not seem to support PEEK and POKE. (Although UniComal's IBM COMAL does, as well as other Commodore COMAL keywords like change, curcol, currow, free, and main.)

2) On the C-128, CP/M COMAL lets you access the C-64 I/O chips using the INP and OUT commands. It can also PEEK and POKE RAM bank 0 and the VDC chip. The C-128 2.0 cartridge will also let you get to the C-128's VDC chip.

3) CP/M COMAL on the C-128 supports fancy on-screen editing, includes new functions and commands (like SYMBOLS to print the name and type of each active variable), allows two programs in memory at one time (you shift back and forth with one-word commands, but cannot multitask), and defines several C-128 keys that CP/M does not support directly (like the lower cursor keys).

4) Most versions of COMAL are available from the COMAL Users Group. Mytech COMAL is also available directly from Mytech Software, Inc., 111 20 Roselle Street #E, San Diego, CA 92121 (phone: 619-452-9847).

and light pens. It even has a font package so you can change the character set or save a specific character set for use with one of your programming masterpieces. If you have the hardware, you can actually design your own packages (in assembly language), burn them into an EPROM chip, and plug the EPROM into the empty socket in the cartridge. Just think of yourself as a language designer.

On a C-128, you can not only run both C-64 COMALs (as well as CP/M COMAL), but now you can also choose a C-128 cartridge COMAL (if you have the better part of $200 burning a hole in your pocket).

The C-128 cartridge has the full COMAL Kernal. It includes all of C-64 COMAL plus support for the 1571 drive features, and 40K for special RAM files. It even has a machine language monitor which lets you examine the contents of memory. And it gives you 40K of program storage, access to the 80-column screen, and the fast speed of the C-128 if you want it. But watch your power supply, because this cartridge uses three 32K EPROMs and needs juice.

CP/M COMAL is finally available (for well under $100) and fully implements the Common COMAL Standard. Although it will run on most any CP/M computer under CP/M 2.2 or 3.0, I like it on the C-128. Just boot CP/M, run the install program one time, and COMAL is ready to go. You can get CP/M COMAL as a demo or as a full implementation with an optional runtime package.

The demo version, which can be copied and shared with your friends, is complete except that SAVE, MERGE, and ENTER are disabled. The full implementation includes a 170-page manual and can use a RAM expander as a RAM disk, but is missing graphics and sound extensions. The runtime "compiler" system lets you save your programs as .COM files that can be run by you or your customers without having COMAL.

IBM-compatible COMAL is available in two flavors, either from UniComal or from Mytech. UniComal is expensive (around $600) and very fast. It allows 64K for program storage and 64K for variables. It can pass commands to DOS and supports graphics (turtle) on an EGA (hi-res color) system. UniComal's implementation is full Common COMAL. Mytech's is not, but (for under $100) it's real close; it has a few syntax variations and a few unsupported keywords. Mytech's full-screen editor is as nice as I've seen.

Apple COMAL, at least the early version 1.0, should be ready by the time you read this. Its developer, David Stidolph (1670 Simpson #102, Madison, WI 53713) had a preliminary version 0.39 available last August. Price? Probably under $100.

To wrap up, COMAL is officially adopted for use in schools in Sweden (Compis computers), Denmark (RC Piccolo computers), Norway, and Ireland. It is approved for use in Scotland and...

Wait, do you really want to know about Amiga COMAL? There are rumors that it is under development. But I've been running it for months. Easy as pie. Just toss Kickstart and Workbench 1.1 into your Amiga 1000. Then load the Amiga Transformer. Once you have this MS-DOS emulator utility working to your satisfaction, run ZPEM. That's an 8080 (CP/M) Emulator for MS-DOS, in the public domain, from Livingston Logic. Next, you will have to modify a screen driver and copy CP/M COMAL onto an MS-DOS disk. Now you're ready to load CP/M COMAL and experiment with my little kludge—the world's slowest implementation of COMAL. ☐

BACK ISSUES OF Ahoy!

#2–FEB. '84 Illustrated tour of the 1541! Artificial intelligence! Synapse's Ihor Wolosenko interviewed! String functions! And ready to enter: Music Maker Part II! Screen Manipulation! Night Attack! Relative Files!

#3–MAR. '84 Anatomy of the 64! Printer interfacing for VIC & 64! Educational software series begins! VIC game buyer's guide! And ready to enter: Address Book! Space Lanes! Random Files on the 64! Dynamic Power!

#5–MAY '84 Future of Commodore! Inside BASIC storage! Memory management on the VIC & 64! Guide to spreadsheets! Hurray for arrays! And ready to enter: Math Master! Air Assault! Biorhythms! VIC Calculator!

#7–JULY '84 MSD dual disk drive! Database buyer's guide! Training your cursor! Screen displays! File Sleuth! Users Groups! And ready to enter: Renumbering! Checklist! Math Defender! Brisk! What's My Job?

#8–AUG. '84 Choosing a word processor! Computational wizardry! Creating your own word games! Sound on the 64! And ready to enter: Micro-Minder! Directory Assistance! The Terrible Twins! Words Worth!

#9–SEPT. '84 Program your own text adventure! Build a C-64 cassette interface! Video RAM! Word processors, part II! And ready to enter: Salvage Diver! DOS! Sound Explorer! The Castle of Darkness! Base Conversions!

#10–OCT. '84 C-64 graphics programs! Bit-mapped graphics! Joystick programming! Graphics processing! And ready to enter: VIC 40 Column Operating System! BAM Read & Print! Emerald Elephant! Lawn Job!

#11–NOV. '84 Music programs & keyboards for the 64! Graphics feature continues! 2-D arrays! And ready to enter: PTE word processor! Block Editor! Alternate Character Set for the 64! Tunnel of Tomachon!

#12–DEC. '84 Buyer's guide to printers! 1525 printer tutorial! Fast graphics with custom characters! Guide to KMMM Pascal! Diving into BASIC! And ready to enter: Construction Co.! Space Patrol! Cross Ref!

SOLD OUT

#13–JAN. '85 VIC and 64 OS exposed! Sprites! Insert a 1541 device # disconnect switch! Ghostbusters! And ready to enter: Ultra Mail! Music Tutor! Alice in Adventureland! Midprint! To the Top! Tape/Disk Transfer!

#14–FEB. '85 Printer interfacing! Multicolor sprites! Modems! Bulletin Boards! Theory of game design! Buying a modem! And ready to enter: Futurewar! Fontasia! VIC Eraser! Insurance Agent! Flankspeed! Telelink 64!

#15–MAR. '85 Creating multiscreen gameboards! Inside the Plus/4! Commodore DOS! And ready to enter: Old Routine! Programmable Functions! Automatic Line Nos.! Home Budget! Salmon Run! Numerology!

#16–APR. '85 Assembly language column begins! Programming the joystick! 1541 disk drive alternatives! The Kernal! And ready to enter: Hop Around! Faster 64! Booter! Elecheck! BASIC Trace! Space Hunt!

#17–MAY '85 Disk drive enhancements! Install a reset switch! Assembler escapades! And ready to enter: Super Duper! Two-Column Directory! DSKDU! Raid! DOS Plus! Font Editor! Tile Time! Interrupt Wedge!

#18–JUNE '85 Music & graphics entry system! How modems work! Inside the 6510! And ready to enter: Quad-Print! Mapping 4.4! Towers of Hanoi! Speedy! Duck Shoot! Bit Dumping! Screen Magic! 6510 Simulator!

#19–JULY '85 PROM Programming! 3-part harmonies on VIC/64! Speeding pixels! And ready to enter: Auto-Append! Script Analysis! Wizard of Im! Lucky Lottery! Brainframe! Etch! Printat! Autos: Leasing v. Buying!

#20–AUG. '85 Inside the 128! Real-world simulations! Sound effects! Modems! And ready to enter: Windows! Formatter! Sound-a-Rama! Screen Dump! Selectachrome! Disintegrator! Fidgits! Gators N Snakes!

#21–SEP. '85 Inside the 1571 drive and 128 keyboard! Sprite programming! And ready to enter: Fastnew! Go-lister! File Lock! Dragon Type! Superhero! Auto-Gen! Moxey's Porch! Fish Math! Ahoy!Dock! Invective!

#22–OCT. '85 Create cartoon characters! Infinitesimal intrigue! Secrets of copy protection! And ready to enter: Shotgun! Maestro! Solitaire! Mystery at Mycroft Mews! Gravinauts! 1541 Cleaning Utility! Shadey Dump!

#23–NOV. '85 Guide to adventure gaming! ML sprite manipulation! BASIC for beginners! And ready to enter: Lightning Loader! Knight's Tour! Chopper Flight! Rhythmic Bits! Instant Bug Repellent! File Scout! Slither!

#24–DEC. '85 Speech synthesizer! The IBM Connection! The year's 25 best entertainments! And ready to enter: Gypsy Starship! Directory Manipulator! Cloak! Gameloader! Jewel Quest! Lineout! Santa's Busy Day!

#25–JAN. '86 Build a speech synthesizer! Survey of sports games! And ready to enter: Martian Monsters! Streamer Font! Microsim! Haunted Castle! Knockout! Infraraid! Alarm Clock! Memory Check! Scratch Pad!

#26–FEB. '86 Windows! Build an auto-exec cartridge! Align your 1541! Survey of flight simulators! Structured programming! And ready to enter: Arena! Head to Head! Crabfight! Treasure Wheel! Character Dump!

#27–MAR. '86 Programming educational games! Memory dumpers! Choosing a copy program! Custom characters! And ready to enter: Ahoy!Term 128! Trivia Game Maker! Brickbusters! Easy Lister! Programmer's Aid!

#28–APR. '86 Comet catching! Survey of action and strategy games! Screen dumping! And ready to enter: Chrono-Wedge! Mr. Mysto! Air Rescue! Notemaker! Screen Window! JCALC! Hidden Cavern! Swoop!

#29–MAY '86 128 graphic bit map! Epyx strategy guide! 128 commands! ML music programming! And ready to enter: Bigprint! Star Search! Failsafe! English Darts! Ski Folly! Free RAM Check! Alchemist's Apprentice!

#30–JUNE '86 Debugging dilemmas! Public domain software! Winning at Ultima! Computer Aided Design! And ready to enter: LazyBASIC! Got A Match? Star Strike! Queen's and Bishop's Tours! Shaker! Trackdown!

#31–JULY '86 Inside the Amiga! Conditional branching! Chess programs! 128 and 64 DOS! And ready to enter: Screen Sleuth! Skull Castle! Head-on! Nebergall Run! Wordcount! Crazy Joe! Fidgits' Music School!

#32–AUG. '86 Inside the Amiga, part II! Approaching infinity! C-64 war simulations! Pascal for beginners! ML graphics! And ready to enter: Reversi! Highlight! Disk Cataloger! Meteor Run! Trim! Step On It! Flap!

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VIDEO SNAPSHOT

Graphic and Text Screen Archiver for the Commodore 64

By Jim Partin

At one time or another you have probably come across a fabulously great graphic or text screen display that you just had to preserve and keep. Maybe it was part of another program, and to view it you had to tediously LOAD and RUN the large and bulky program that created it. And even then, you couldn't alter or manipulate the screen display to your satisfaction as you could with one of your own works of art. Or worse yet, it was one of those "one time only" type screens that contained the only proof you had that you scored ten quadrillion points on your favorite space shoot-em-up.

What you needed was a different kind of screen dump utility that would, instead of sending a copy of the display to the printer, take a "snapshot" of the particular screen in memory and put it on disk. *Video Snapshot* for the C-64 does just that. It's a utility which will allow you to capture a copy of almost any type of graphic or text screen and place it on a disk for later use. Once the screen is on disk, you can use, view, or alter it to your satisfaction.

Video Snapshot will work on any C-64 or C-128 (in 64 mode). You should first type in and save a copy of the program. Be sure to save a copy–the program erases itself after being run. You can install *Video Snapshot* by simply typing RUN. The utility will then quietly reside (as long as you don't reset or turn off your machine!) in your computer until you need it. Before activating the utility, you should make sure that the screen you wish to capture is being displayed, and that a disk with appropriate storage space is in the disk drive. The amount of space you need depends on the type of display you're trying to capture. High resolution graphic screens require at least 37 disk blocks, multicolor graphic screens require at least 40 blocks, and text screens require 8 blocks.

If you aren't sure what type screen you're trying to capture, *Video Snapshot* provides a key. First, hit the RESTORE key once to activate the utility. Notice that the screen border color will change. If the border turns black, the screen is a high resolution (320 by 200 pixel display) bit mapped screen. Likewise, if the border turns white, you have a multicolor (160 by 200 pixel display) bit mapped screen on your hands. And finally, if the border turns blue, the screen is a normal text screen.

At this point, if you find that you don't have enough disk space or just don't want to continue, hit the RETURN key and the utility will abort and return you to where you originally left off. If you decide to continue, though, the utility expects you to type ONE letter or number to be used to as an i.d. for the disk file containing your screen. (Please note that no onscreen prompt will be displayed reminding you to type this i.d. character. The only hint that *Video Snapshot* is active is the altered border color.) After that, the screen display will turn blank, and your screen will be saved to disk under a filename created from the i.d. character you entered. If a disk error happens to occur while the screen file is being written, the program will abort and leave the disk drive error light blinking. This is done so that you can determine the problem, possibly fix it, and try the snapshot process again if needed. If the snapshot process was without incident, though, the program will dump you back, right at the point where you first activated *Video Snapshot*. You may then reactivate it as many times as you wish until you reset or turn off your computer.

Video Snapshot will capture all three major types of graphics and text screens. High resolution bit mapped screens (320 by 200 pixels) are saved as files that are compatible with the popular *DOODLE!* drawing program. After capturing one of these screens, the screen file will appear in the directory of your disk as such: "DDSNAP [i.d. character]". The reference to the i.d. character refers to the i.d. you entered after activating *Video Snapshot*. (What i.d. characters actually do is allow you to capture more than one screen display on the same disk by assigning different i.d.'s to different screens.) Hi-res/*DOODLE!* files can also be viewed on a C-128 in 40 column mode by typing GRAPHIC 1:BLOAD "[filename]",P7168.

Multicolor bit mapped screens (160 by 200 pixels) are saved in a format compatible with the widely used *Koala Painter* paint program. These files appear in the directory as such: "[reverse spade symbol]PIC [i.d. character][9 spac-

es]". The reverse spade symbol actually represents the code for the color orange which has an ASCII value of 129 and can be obtained, while in quote mode, by holding down on the COMMODORE logo key and hitting the '1' key.

Text screens are saved directly as two files. The first file contains the actual screen memory data, while the second file contains the corresponding color memory of that screen. These files appear in the directory of the disk as "SNAP [i.d. character].SCN" and "SNAP [i.d. character].CLR" respectively. You may display them at any time by leaving a LOAD "[filename]",8,1 command (be sure to always issue a NEW command after LOADing the screen if you are working in direct, or non-program, mode). As far as the viewing and editing of either high resolution or multicolor screens goes, if you don't have *DOODLE!*, *Koala Painter*, or both, you can still make use of the files by using a conversion utility to translate the files into the format used by your own paint program, or you can just view them by using a special program to display the screens. There are a few commercially sold utilities of this sort and quite a few are in the public domain (Q-Link and other online telecommunications networks have plenty of them available for download). But *Video Snapshot* is not perfect. What this means is that you can rule out capturing video special effects such as sprites, custom character sets, and raster/split-screen effects. *Video Snapshot* will, though, capture any standard type screen, bit-mapped or text, from anywhere in memory, without a flaw.

Before embarking on your own, take note of some final safety hints. First and foremost, always remove utility cartridges when using *Video Snapshot*. Cartridges such as Epyx's *Fast Load* can produce unpredictable results when used with *Video Snapshot* and are not worth the risk of keeping installed. In a like respect, compatibility with commercial products such as games and utility programs is somewhat unlikely. Most of these products alter the features that allow *Video Snapshot* to exist. Many of the programs you have from *Ahoy!*, many public domain programs, and many of your own programs should be compatible provided they don't: (1) alter the NMI interrupt vector, and (2) interfere with memory locations $CC96 to $CFFE (HEX). Next, be sure to make certain that your disk drive is turned on and connected before activating this utility. If the disk drive is off, the utility probably won't crash, but could destroy part or all of your screen display in the process. The actual disk drive you use with the utility shouldn't matter as long as it is configured as DEVICE 8, DRIVE 0. The Commodore 1541, 1571, and 1581 disk drives have been tested and found to work well with *Video Snapshot*. Also, you should make sure that no disk files are open at the time you activate *Video Snapshot*. If there are, the utility will close them—sometimes a quite undesirable effect, so be careful. And finally, most important, never, *never* activate *Video Snapshot* (or for that matter, hit the RESTORE key) while the disk drive is being accessed, such as during a directory listing or program load. If you do, your computer will almost surely crash and lock up completely.

Video Snapshot should prove to be an extremely useful addition to your utility library. I've already found numerous uses for it. I'm confident that you will too. □

SEE PROGRAM LISTING ON PAGE 78

Ahoy! DISK

Why type in the listings in this month's *Ahoy!* when we've done it for you? All the programs in this issue are available on the current *Ahoy! Disk* for $8.95. Isn't your time worth more than that?

Use the coupon at the bottom of this page to order disks for individual months, a disk subscription, or the special anthology disks described below. (You can also subscribe to the *Ahoy! Disk Magazine*— disk and magazine packaged together at a special reduced rate. See the card bound between pages 50 and 51.)

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TRAP SHOOT

For the C-64

By Matt Pierce



PHOTO: MICHAEL R. DAVILA

Trap shooting is the sport of firing at frisbee-shaped targets commonly called clay pigeons. The clay pigeons are sprung into the air from a trap (small building in front of the marksman). The trap operator alters the direction and altitude at which the pigeon flies to vary the difficulty of the targets. Competitors use shotguns to fire at the clay targets. As you aim, you must lead the target slightly, then fire. It is best to hit a pigeon while it is climbing or floating rather than while descending.

Type in and save both parts of the program: the BASIC portion and TRAP.SPRTS. Leave the disk containing both portions in the disk drive so that the sprites will be loaded into memory. A menu will come up on the screen once the sprites are loaded in. There are three options: to 1) select the level you wish to play at, 2) designate the number of shotgun shells a player is allowed per target, and 3) begin the game.

When the game begins, you'll notice a man in a red shirt and black pants shouldering a shotgun. You control this man's aim by aiming the black crosshairs in the middle of the screen with a joystick plugged into Port 2. Directly in front of your marksman are two traps out of which pigeons intermittently spring. To fire the shotgun, hit the joystick button when the dot in the center of the sights is aligned directly in front of the target (you must lead the pigeon slightly).

On the bottom line of the screen the current statistics are displayed. They include (from left to right) the number of shells remaining for the current clay pigeon, the number of targets hit, the total number of pigeons that have been sprung, and the total amount of shotgun shells that have been used. The game terminates once 30 pigeons have been sprung. At this point, statistics of your performance are displayed. They include the percentage of targets hit, a ratio of shells fired to targets hit, and a rating of your performance. Once you have completed viewing the stats, hit any key to initiate a new game. □

SEE PROGRAM LISTING ON PAGE 79

TURBO SKI

For the C-64

By Bob Blackmer

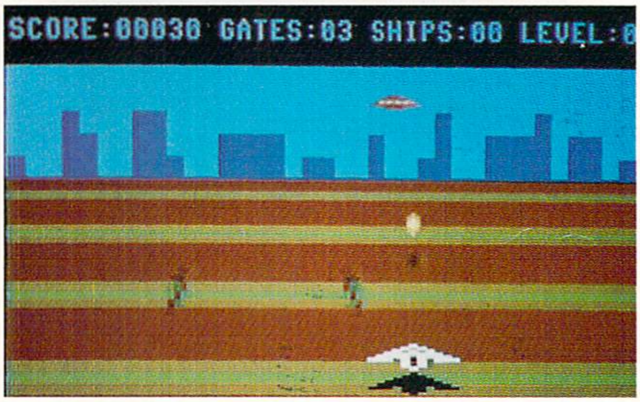


PHOTO: MICHAEL R. DAVILA

Turbo Ski is a very realistic three-dimensional flying simulation based on my concept of a future Olympic event styled after the biathlon. The object of the game is to maneuver your jet through a series of gates, similar to slalom skiing, while shooting UFO's that fly over a distant city.

If you successfully navigate the 16 gates and shoot at least one UFO, you will receive an extra jet and advance to the next level. The speed of your jet and the UFO targets will increase as a level is completed. If you fail to shoot a UFO or miss any gates, you will lose one of your jets and the current level will be repeated.

To maneuver your jet, push left or right on a joystick plugged in Port 2. To fire at a passing UFO, press the fire button and a rocket will be launched from your jet. If you miss, don't worry: I've given you an inexhaustible supply of rockets.

The last gate on each level will be yellow instead of black. The game has an automatic pause after the last gate. If you wish to continue uninterrupted, merely push forward on the joystick as you pass through the last gate.

Each gate and UFO is worth 10 points times the current level, up to a maximum of 100 points. The speed will top out on level 12, but there is plenty of action after this point in the game. You can earn up to a maximum of nine ships. The highest level I reached was level 25 with a score of 72000. As always, there will be readers who can easily surpass my performance.

To enhance the 3-D effect, a total of 26 sprite shapes are used in the program. *Turbo Ski* is written in machine language and must be entered using *Flankspeed* (see page 67). After typing in and saving a copy, reset the machine and LOAD "TURBO SKI",8,1. Then enter SYS 49152 to start. □

SEE PROGRAM LISTING ON PAGE 75

Free Spirit Software Inc.

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Dec., 1987

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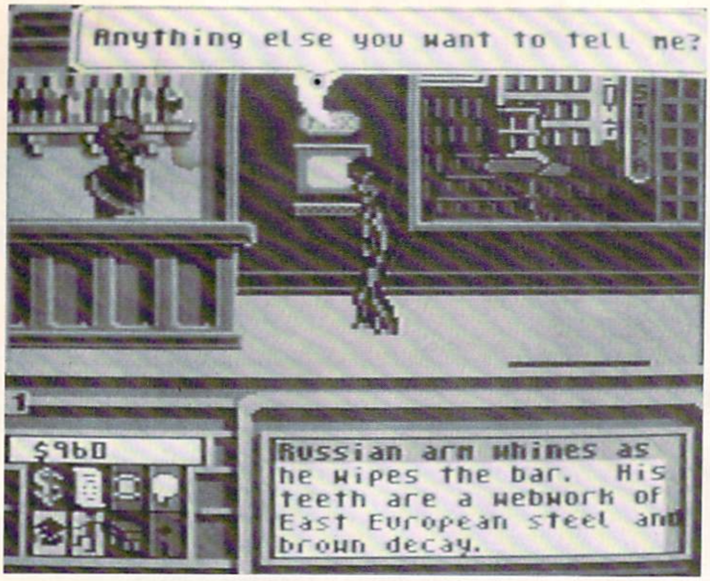
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Reader Service No. 155



As the space cowboy hero of William Gibson's awardwinning novel, Neuromancer *sends you into Cyberspace to thwart a computerized conspiracy.* ***READER SERVICE NO. 267***

Continued from page 14

address list, page 14).

Based on the sci-fi novel, *Neuromancer* ($39.95) lets you, a futuristic cowboy, invade the electronic universe that ties together all of Chiba City's computer networks. Over 57 real world locations can be visited, and over 40 databases broken into. The game features a digitized original soundtrack by DEVO.

Interplay Productions, 714-476-8686 (see address list, page 14).

Moffatt's Adventure Disk #2 ($19.95) comprises four text adventures on one C-64 disk: *Temporal* (wander through a surrealistic environment, trying to return to reality), *West* (a stranger in an Old West town, you're deputized and sent to capture Black Bart), *Death Valley* (stranded in the desert without food or water, you must find your way to safety), and *The Lighthouse* (capture a group of spies holed up on a remote island).

Free Spirit Software, Inc., 800-552-6777 or 312-352-7323 (see address list, page 14).

Scheduled for November release, *The Twilight Zone* ($39.95) will, like the TV series, allow the C-64 gamer to experience a bizarre storyline with a twist ending.

First Row Software Publishing 215-337-1500 (see address list, page 14).

Main Event ($29.95) lets wrestling fans set two-man teams from a selection of eight contestants, and fight for the tag team championship. A variety of maneuvers are possible, including pile drivers, airplane spins, and atomic drops.

Gamestar, 415-329-0800 (see address list, page 14).

IntraCorp is offering a $10,000 grand prize and 2500 software gift certificates worth up to $200 each in a contest to launch *Murder on the Atlantic* ($39.95). Set in 1938, the game requires software sleuths to explore a luxury liner's 600 salons and staterooms seeking clues, decoding looks, avoiding booby traps, and locating and questioning the 40 suspects. The program includes over 60 clues and 16 questions to answer; the contestant who submits the most correct answers will win the grand prize.

IntraCorp Inc., 305-252-9040 (see address list, page 14).

New for the 64 from Paragon:

Twilight's Ransom ($34.95) puts you on the savage streets of Liberty City, where you must confront hordes of hustlers, con men, drug dealers, and other outcasts in your search for your kidnapped girlfriend. Saving her will require you to unravel a web of danger and intrigue involving the treacherous underworld of international gun running. You'll visit over 175 locations, from the subway system to Liberty Park.

Wizard Wars ($44.95) casts the player as a heroic mage who must defeat dragons, elves, and other creatures in order to thwart the plans of the mad wizard Aldorin.

Paragon Software, 412-838-1166 (see address list, page 14).

IC PROJECTS

The IC User's Casebook ($12.95) details more than 100 projects for computer hobbyists. Each chapter takes a casebook approach, spelling out all needed steps. The projects encompass linear and digital devices, timers, and general devices, and utilize readily available parts.

Howard W. Sams & Company, 317-298-5722 (see address list, page 14).

ACTIVISION CHANGE

Activision has adopted a new corporate name—Mediagenic—to reflect the company's expansion into diversified product lines. The Activision name will continue to be used for the company's action and simulation games.

Mediagenic, 415-329-0800 (see address list, page 14).

PRICE BOOM

Free Spirit has lowered the price of *Explode!* V. 3.0 from $34.95 to $20.00. The C-64 fast loader cartridge works with the 1541/41C/71 and FSD disk drives, as well as the SX-64. An included screen capture utility saves screens to disk or dumps them to the printer. With a 128 mode lockout switch, the price is $25.00.

Free Spirit Software, Inc., 800-552-6777 or 312-352-7323 (see address list, page 14).

LEARNING LIBRARIES

Hi Tech Expressions has once again repackaged those six Sesame Street titles that date back practically to the release of the C-64. *Astro-Grover, Ernie's Magic Shapes,* and *Big Bird's Special Delivery* make up the *Sesame Street Learning Library, Volume 1; Grover's Animal Adventures, Ernie's Big Splash,* and *Pals Around Town* are in *Volume 2.* Each C-64 package costs $24.95. Get yours while supplies last.

Hi Tech Expressions, 212-941-1224 (see address list, page 14).

AND RUNNING LAST...

Daily Double Horse Racing ($19.95) provides you with past histories of 180 horses and 12 jockeys competing in nearly 400 races, allowing you to handicap and place bets from straight wagers to parlays, quinellas, exactas, and daily doubles. The races are run with animated 3-D graphics.

Artworx Software Company, 800-828-6573 or 716-385-6120 (see address list, page 14).

COLOR EDITOR



By Richard Curcio

By changing the colors of objects on the 40 column display, you can bring your C-128 graphics to life. With careful planning, a river or waterfall can appear to be flowing. A smoldering volcano can illuminate the smoke clouds above it. Or "ghostly" messages can appear. One way to achieve these effects is to change color sources and redraw the object. *Color Editor* offers an easier way.

THE LOADER

Type in and save COLOREDIT (page 81). It is a BASIC loader that POKEs the machine language for *Color Editor* into location 4864 on the C-128. The ML requires 380 bytes followed by 125 bytes for storage. The routine can be located elsewhere by changing the variable CE in line 110. The loader will make the necessary adjustments to relocate the ML and report the range of memory occupied.

COLOREDIT can alter four types of colors. The computer must be in the BANK 15 configuration to use this routine. The format for COLOREDIT is:

```
SYS CE, type, old color, new color
```

where CE is the location of the ML.

Types 0-2 are for use with bit maps, while type 3 is for 40 column text. "Old color" is the color to be replaced by "new color." Colors are numbered 0-15, one less than BASIC's 1-16. COLOREDIT also provides an "undo" operation, setting colors back the way they were before the most recent alteration. The format is SYS CE, 4. New color and old color are not needed for undo, and if present will be ignored. An alteration can be undone only once. You cannot undo an undo. If you wish to BSAVE the COLOREDIT ML, undo should be the last operation performed. In this way, when the ML is BLOADed at a later time, you will be prevented from inadvertently performing an undo of an operation that has not yet taken place. Remember, the end address for BSAVE is the last address plus 1.

USAGE

A comprehensive discussion of C-128/64 graphics cannot be offered in one article. This section will only deal with color mapping and the COLOREDIT routine. For more information on C-128 graphics, consult the *C-128 Programmer's Reference Guide* or any of the informative articles on the subject that have appeared in this magazine.

Standard Hi-Res: A COLOREDIT type 0 operation affects the lower nybbles of the video matrix at 7168-8167. These provide the colors for objects drawn with color source 0, displayed by "0" pixels in each 8-byte area in standard hi-res. This is referred to as the bit map background, which should not be confused with the text screen color, even though both are set by the COLOR 0, n statement.

A type 1 operation affects the upper nybbles of the video matrix. These are the colors for "1" pixels in standard hi-res, the bit map foreground. These colors are assigned using color source 1, set by the COLOR 1, n statement.

Multicolor: If you draw something in graphic mode 3 or 4 and switch to GRAPHIC 1 or 2 without clearing the screen, the display changes drastically. Because colors are determined by pixel pairs on the bit map, four colors can appear in a character "cell," and the color sources behave differently.

A COLOREDIT type 0 operation again affects the lower nybbles of the video matrix. However, in multicolor these are color source 2 colors, displayed by "10" pixel pairs. This is also called Multicolor 1. As in standard hi-res, a type 1 operation affects the upper nybbles of the video matrix. These are source 1 colors, displayed by "01" pixel pairs and set by the COLOR 1, n statement.

A type 2 alteration affects color memory at 55296-56295. These are color source 3 or Multicolor 2 colors, set by COLOR 3, n and displayed by "11" pixel pairs. (In multicolor mode, "00" pixel pairs get their color from the VIC-II chip background register at 53281. This is Color 0, common to the whole screen only in GRAPHIC modes 3 or 4, or 40 column text.)

To summarize: in hi-res, COLOREDIT type 0 affects COLOR 0 areas and type 1 affects COLOR 1. In multicolor, type 0 changes COLOR 2 (MC 1) areas, type 1 changes COLOR 1 areas, and type 2 changes COLOR 3 (MC 2) areas.

A type 3 color replacement affects the character colors of 40 column text, controlled by the "other" color memory also at 55296-56295. This is explained under "How and Why."

Type 4, undo, works correctly on 40 column text only if the screen has not scrolled since the previous type 3 operation. Text scrolling can be disabled with ESC-M or PRINT CHR$(27) "M". Although the C-128 doesn't provide bit map scrolling, it is possible. The same restriction on undo applies to bit map colors if you have a bit map scrolling utility.

Except for type 2, all COLOREDIT operations take place whether the particular screen is visible or not. The routine returns no error messages to disrupt your display, but the processor's Carry bit will be set by illegal quantities, no graphics area (for types 0-2), undo after undo, or a type 2 operation on a non-multicolor display. Carry will also be set if an attempt is made to undo a type 0-2 operation after the graphic area has been deallocated by GRAPHIC CLR. Using the RREG function immediately after SYS can read the status register into a variable, like this:

```
SYS CE, 4: RREG,,,SR
```

The three commas must be present so that the A, X, and Y registers are ignored. If SR AND 1 = 1, the Carry was set and something went wrong with the call.

For a text screen it's obvious what type of color is displayed. For a bit map display it's almost impossible to tell which type of colors are in any given portion of the screen by simply looking at it. To aid in the identification of color areas, two short, relocatable utilities are provided. COLORTOTAL gives a count of the number of times a particular color of a particular type occurs. The syntax for COLORTOTAL is SYS CT, type, color. "CT" is the start address of the routine and "type" and "color" are as described for COLOREDIT. Only color types 0-2 are supported by this program. If the graphics area hasn't been allocated, or has been deallocated, a NO GRAPHICS AREA error is returned. A TYPE MISMATCH error occurs if an attempt is made to get a count of type 2 colors when the display is standard bit map. In immediate mode, COLORTOTAL prints the number of occurrences of the color searched for. In a running program, the routine returns with the high byte of the count in the accumulator and the low byte in the X register. The RREG function can put these values into variables. The process would look like this:

```
SYS CT, T, C: RREG A, X: COUNT = X + 256
* A
```

The IDENTIFY program provides another means of determining the types of colors in an area. Its format is SYS ID, column, row. You give the routine the *character* coordinates of the area you want to identify and it returns with the low nybble of the video matrix in the accumulator, the high nybble in the X register, and the multicolor nybble in Y. If Y = 255, multicolor mode is not in effect. Again, RREG retrieves the values:

```
SYS ID, 0, 0: RREG BG, FG, MC
```

reads the colors in the top left character-sized area into BG, FG, and MC. Remember, color numbers are one less than BASIC's numbering.

DEMONSTRATION

The COLORDEMO program puts COLOREDIT through its paces and illustrates some of the intricacies previously described. In line 120, the background, foreground, border, and text colors are specified. Line 130 establishes a hi-res split screen and changes the background color. Two different colored backgrounds are visible because when the bit map is cleared, the video matrix is filled with COLOR 0 and 1. Subsequent changes of COLOR 0 affect the text background or objects drawn with color source 0. In line 160, a BOX is drawn and filled by COLOR 1 and line 180 calls COLOREDIT to change the color. Note the use of the RCLR function to determine old color and new color. The subroutine at line 480 performs undo. Line 210 calls COLOREDIT to change the bit map background.

Line 260 establishes new colors and line 270 creates a multicolor bit map without clearing it. The box changes color because of the differences in color mapping in multicolor mode. When the multicolor bit map is cleared by SCNCLR 3, the video matrix is filled with COLOR 1 and 2—another difference in color handling. Clearing the multicolor bit map also fills color memory with COLOR 3.

Lines 280-300 draw three boxes using difference sources, illustrating the difficulty in determining the "type" of color used to draw an object. The program proceeds to alter and undo the boxes and the text. Before ENDing, the bit map is switched back to hi-res to more dramatically show the differences between multicolor and hi-res color mapping.

HOW AND WHY

To facilitate the undo operation, a record must be kept of the locations in the color map changed during the previous type 0-3 operation. COLOREDIT accomplishes this by creating its own bit map, an activity map. After determining that the operation and the colors are valid values, a color altering operation clears this activity map to all zeros. The appropriate color map is then searched for nybbles of "old color." When one is found, it is replaced with "new color", and the corresponding bit in the activity map is set to "1". Otherwise, the bit is left at "0". Undo reverses the process, searching the activity map for "1"s and restoring the corresponding nybble in the color map to "old color," which was saved internally (along with "type") during the replacement operation. Since bits are used to keep track of bytes, 1000/8 = 125 bytes for the activity map.

Color memory at location 55296, used by multicolor and text, presents a complication when a split screen is in effect. The C-128 contains two 1K blocks of color memory at the same address. For a multicolor/text split screen, the operating system continually switches between the two, so that the VIC-II chip first displays one for the multicolor bit map, and then, when the raster reaches the split point, the other color block is displayed for text. For COLOREDIT to "see" the correct block for a particular operation, this switching must be temporarily disabled. An SEI instruction disables all IRQs, including the raster interrupts that cause the block switching. To allow the 8502 microprocessor access to the proper block, the contents of location 1 are saved, then bit 0 of that location is set to 1 for the text color block or cleared to zero for the multicolor block. The equivalent operation in BASIC would be POKE 1, PEEK(1) OR 1 or POKE 1, PEEK(1) AND 254. Color memory is examined and possibly changed, location 1 is restored to its original contents, and IRQs are reenabled by CLI. This process takes place for each byte of the color map. If interrupts were disabled only at the start and reenabled at the end of COLOREDIT's operation, a split screen would flash to all text or all bit map, depending on where the routine catches the display. (Bit 1 of location 1 controls which block the VIC chip displays. This makes it possible for the microprocessor to read or write one color block while the VIC displays the other. Pretty tricky.) By switching color blocks for each byte, a split screen merely exhibits some jitter at the split point, instead of flashing, while COLOREDIT is operating. For similar reasons, several BASIC 7 commands and functions can produce the same jitter on a split screen.

COLOREDIT doesn't use the usual "free" zero-page locations 251-254. These locations are rarely available when other utilities are present. Instead, locations $AC-$AF, $C3-$C4, and $CE-$CF are used. Consult a C-128 memory map to learn why these locations can safely be used temporarily. □ ***SEE PROGRAM LISTING ON PAGE 81***

FLOTSAM

Continued on page 21

best used by lay people or pastors who intend to read or study a section of the Bible more than once. As we use a part of the Bible, notes and references can be recorded electronically. I prefer having those personal notes on disk. Otherwise the paper notes get hard to sift through after a few years."

S.G. McCracken of Lancaster, PA indicated that he had not read the review, but wrote to chastise us based on what he'd heard second hand(!) Reminds us of many newly converted Christians we've met who offer advice on salvation and other topics without yet having read the entire Bible even once.

Jim Taylor, pastor of Wesley United Methodist Church in Andrews, TX, suggests: "If someone just wanted to read the Bible it would be pointless to buy the *TCRB*, but if one is interested in a very good tool for some serious Bible studying I would certainly recommend it.... If you are teaching a Sunday School class or Bible study you can have copies for all in the class. This would greatly help the class to understand what you are talking about."

We never apologize for unfavorable reviews, no matter how strenuous the objection from the pilloried party—unless we got the facts wrong. In this case, we got the facts wrong. We hasten to point out that our reviewer had many good things to say about Landmark. *As he concluded: "If you are a student of the Bible, or a theology professor who must have a software-based Bible for your 64...*Landmark *is a necessary purchase."*

I am a C-128 owner and have no plans to "upgrade" to the Amiga. The only circumstance that would change my mind would be if the price of the Amiga 2000 including a Bridgecard fell to the point where it was competitive with the IBM clones, so that I could use it as a clone.

I may be unusual in this, but the basic reason is that I find the mouse to be an extremely irritating device. My brother is a representative for Apple computers. I tried his Macintosh. Once. For graphics, I find the mouse inferior to a graphics tablet. For games, it is inferior to a joystick. For serious applications, the point-and-grunt interface is so much slower than control keys that such a computer would end up on the closet shelf. I realize that early commentators said the Amiga could be used without the mouse ("unplug the mouse and throw it out the window," I believe one said), but almost everything since seems too rodent-oriented. From what I have seen, the CLI seems to have been an afterthought, with far less development than would be needed for a truly useful command-type interface.

I believe the future of computing lies in the development of a natural language interface, whether spoken, keyboard, or direct neural connection. I suspect that computer historians of the next century will look back at the point-and-grunt interface as an unfortunate aberration, an evolutionary dead end, that diverted much time and money away from the development of the natural language interface, delaying its attainment.

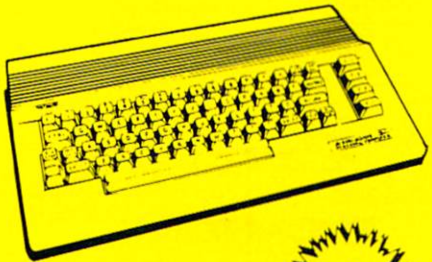
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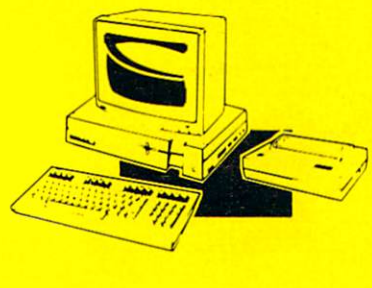
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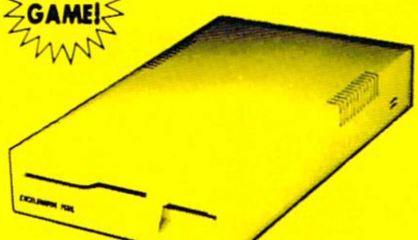


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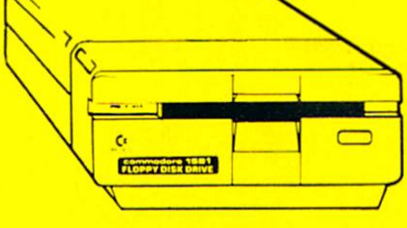
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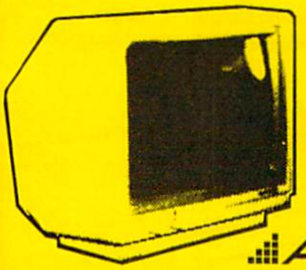
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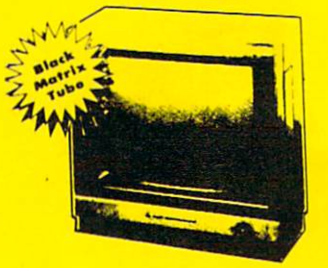
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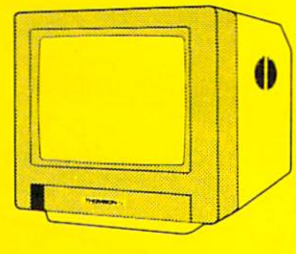
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RUPERT REPORT

Everyone knows that BASIC programs are fast to write but slow to run. Really fast programs must be written in assembly language, but program development in assembly language can be a very time-consuming process.

What are the alternatives? How about an interactive language which allows quick changes and rapid development, and at the same time generates a program that runs quickly?

Perhaps the best of both worlds is a compiled language with an interactive mode. Pascal, FORTRAN, and C are probably the best-known compiled languages. Unfortunately, using a compiled language without an interactive mode can be be a tedious process.

This month we will develop what is perhaps the world's most minimal BASIC compiler. With a compiler handy, we can still develop and debug our programs in the interactive environment of interpreted BASIC. When they are bug-free, we can use the compiler to convert the BASIC programs into equivalent machine language routines.

From then on, rather than executing the interpreted BASIC program which runs at a snail's pace, we can perform the same functions at lightning-fast speeds with the compiled version of the program.

INTERPRETED v. COMPILED

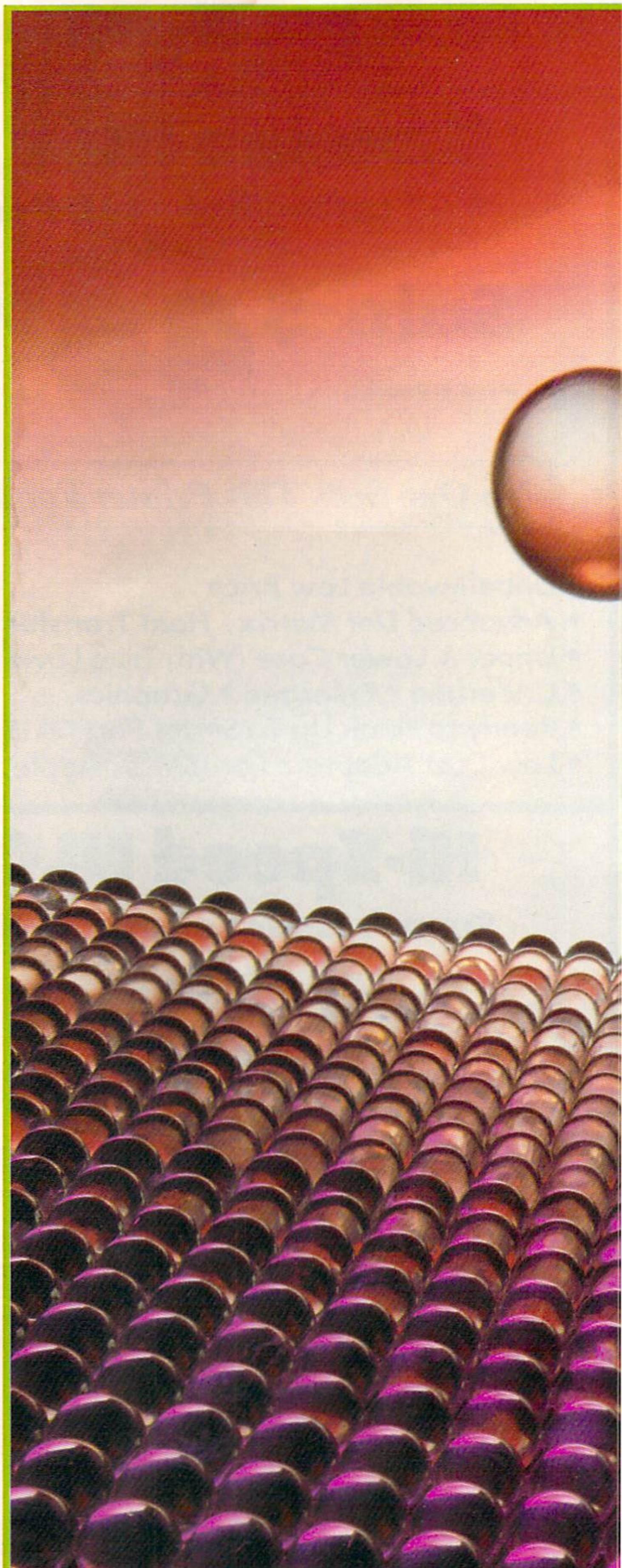
The reason that an interpreted program runs so slowly is that the computer must translate each statement into its native language (machine language) before it knows how to execute it. The translation of a BASIC statement takes a fair amount of time, usually more than the execution of that instruction once it is translated.

The compilation process takes a fair amount of time also. A similar translation from BASIC text to machine language occurs. The difference is that the compiler does not execute the instructions, it merely translates them. The compiler takes the BASIC program text, called the *source code*, and translates it into a separate machine language program, called the *object code.*

Once the object code exists, the user can execute it directly without going through the translation process again. With a compiled language program, the translation of the source code and the execution of the object code are two separate processes.

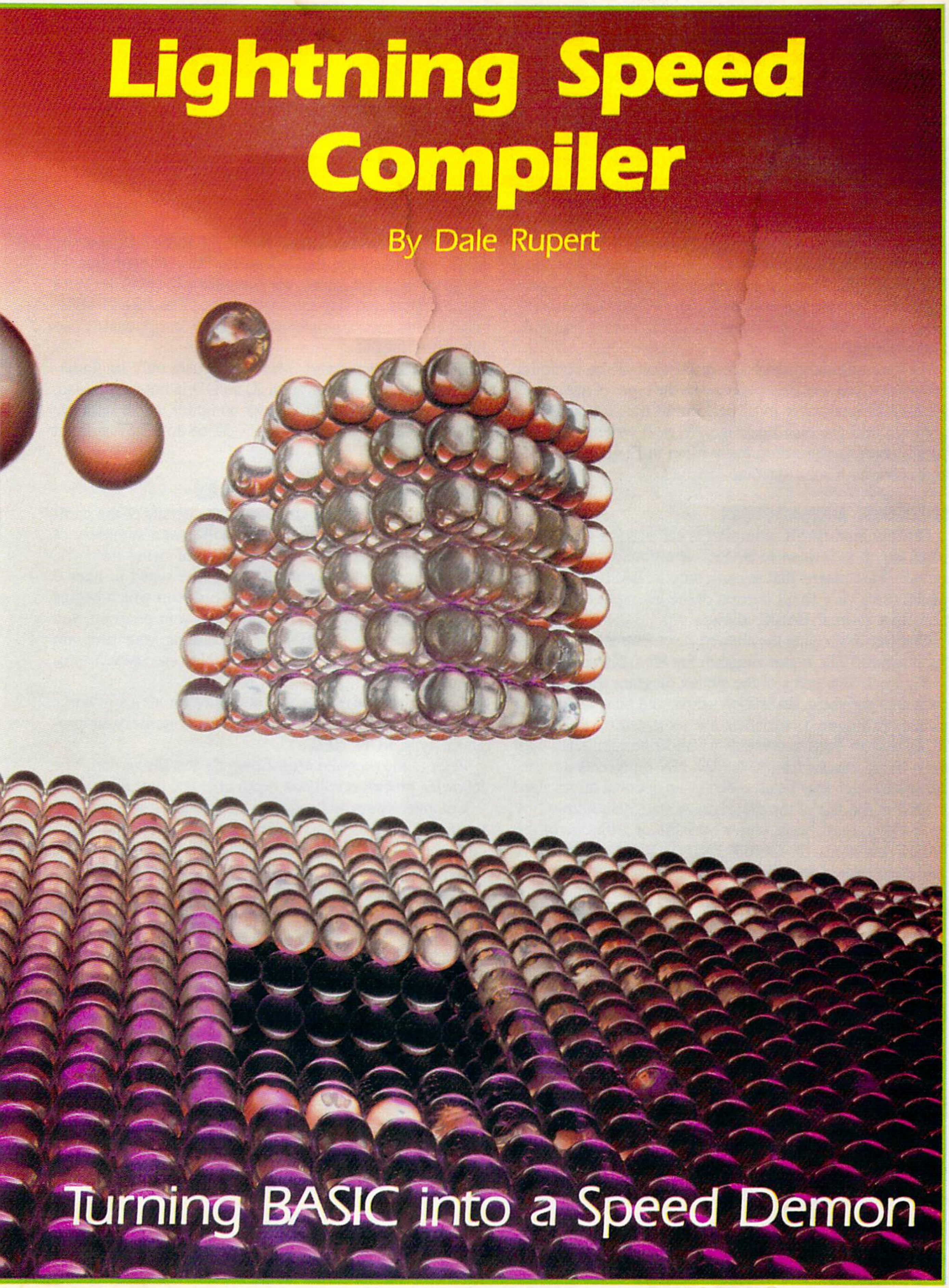
So why do we even use an interpreted language if the compiled language produces so much faster executable code? The main disadvantage of a typical compiled language is that it is not interactive. This means that it is not nearly as easy to debug and to make changes.

If your BASIC program doesn't run right, you might stop it, examine the values of some of its variables, retype one of the statements, and immediately rerun it. With a compiled language, if your program has a bug, you may stop it, but in general you can't simply print out the value of a variable at that point or easily trace the program flow (unless you are using some development tools designed for this purpose). Furthermore, once you make a change to the



Lightning Speed Compiler

By Dale Rupert



Turning BASIC into a Speed Demon

PHOTOGRAPHY: CHRISTOPHER GOULD

source code, you must recompile the entire program before you can execute it again.

Programming in compiled languages is really not as bleak as the previous paragraph implies. There are very powerful tools for single-stepping and variable tracing to help with program development. Still, after any change, the entire program must be recompiled before it can be reexecuted. (There are some incremental compilers which recompile only the affected portions of source code, and some modern compilers provide an interactive user interface, but traditional compilers are more cumbersome.)

For many applications, a BASIC compiler is the best tool. Use the BASIC interpreter in your computer to get the program running the way it should run. When it is correct, compile it, and you are done. You now have a bug-free, fast program.

As we continue through the discussion of the compiler this month, you will better appreciate the types of operations the BASIC interpreter must perform to translate a BASIC program into machine language. We will write a program which reads another program written in English (BASIC) and converts it into machine language.

SYNTAX DEFINITION

Our minimal BASIC compiler is called *Mini-Comp* (see page 68). It is written in BASIC. It allows a very limited syntax. This means that it can compile BASIC programs which use a very small portion of the instructions and options that normal BASIC allows.

One way of showing the allowed statements is with a "syntax diagram." The syntax diagram for *Mini-Comp* is shown in Figure 1. The paths of the syntax diagram show the sequence of variables, BASIC keywords, and punctuation permitted. In Figure 1, variables are indicated by the letters A, B, and C. MM represents a valid line number which must be an integer from 0 to 999. NN represents an integer value which may be preceded by an optional minus sign.

Start at the left of the diagram. A statement allowed by *Mini-Comp* must begin with a variable or with one of the BASIC keywords IF, GOTO, PRINT, REM, or END. A path from each of these components or "tokens" shows what, if anything, may follow. A path with a slash through it is an optional branch.

For example, PRINT may be used by itself or it may be used with any of the following statements:

```
PRINT A

PRINT A;

PRINT CHR$(A)

PRINT CHR$(A);
```

Since this is a very limited compiler, PRINT 10 or PRINT CHR$(13) are not allowed and will produce only a SYNTAX ERROR statement.

To become familiar with the syntax of *Mini-Comp,* use Figure 1 to determine which of these statements are syntactically correct and which will generate SYNTAX ERROR when this program is compiled:

```
10 A=13
20 PRINT CHR$(D)
30 IF A=5 THEN 20
40 GOTO 25
50 B=C+D
60 PRINT A;B;C;
70 DD=-2.6
```

The invalid statements are 30, 40, 60, and 70. Only a variable is allowed after the "=" in line 30. Although line 40 obeys the syntax diagram, the compiler will check for valid line numbers and flag this invalid one. The PRINT statement allows only a single variable with an optional ";", so line 60 is invalid.

Line 70 has two errors. *Mini-Comp* uses only single-letter variable names A through Z, so DD is not valid. Also, *Mini-Comp* is strictly an integer compiler, so all numeric values are limited to the range −32768 to 32767 without a decimal point.

PARSE THE INPUT, PLEASE

In future articles we will discuss the details of the compiler's operation. This month we will give a summary of how the compiler works, and details for using it.

Your program to be compiled must be typed in lines 0 through 999, ahead of the compiler program which begins at line 1000. During the development of your program, you should make line 999 END. After adding your program (source code) to *Mini-Comp,* type RUN to execute your program in standard, interpreted BASIC.

Debug the program as you normally do. Once it works properly, save the entire program. To compile your program, type RUN 2000.

Refer to the program *Mini-Comp* for this discussion. The following processes will now occur after you type RUN 2000.

Compiler arrays and variables are initialized in lines 2000 through 2110. Line 2085 calls a subroutine to load a machine language routine used by the compiled form of the PRINT statement.

Line 2060 and 2070 define the memory map for the compiled code. Addresses 49152 through 49407 ($C000 - $C0FF hex) are for variable storage. Only 52 bytes are used (A through Z, each with two bytes). Object code is stored in 49408 through 53247 ($C100 - $CFFF). BASIC text source code starts at 2049.

Beginning at line 2130, your BASIC source code is scanned byte-by-byte. This process is called "parsing." The first two bytes give a pointer to the next line of source code. The next two bytes are the current line number. The first byte following the line number is fetched. The value of this byte causes the compiler to branch to the appropriate routine to handle the rest of the current source line.

The following common subroutines are used throughout the program. Their functions are summarized here:

1100 Fetch the next byte of source code from program memory; ignore any spaces. Display each byte on the screen.

1300 Check the current source byte to see if it is a vari-

able. If so, set the variable flag VF true. Also calculate that variable's storage addresses: A1 and A0 form the address of the variable's least significant byte ($A1A0); A3 and A2 are for the most significant byte ($A3A2).

1400 Convert a two-byte integer (NX) into high byte (NH) and low byte (NL) format.

1500 POKE a series of bytes into object code memory. N stores the number of bytes. The bytes are stored in C( ). The address and the value are displayed. Memory overflow is checked.

10000 Display Syntax Error message when the fetched code value C does not match the expected code value EC as defined by the syntax diagram. Return to the line in which the error was detected and STOP.

The subroutines starting at 3000 in multiples of 1000 each correspond to one line of the Syntax Diagram. Each subroutine further parses the source code, determining addresses and parameters, and then calls line 1500 to put the appropriate machine language bytes into object code memory before returning.

TWO PASS COMPILER

This compiler makes two passes to generate the object code. On the first pass, all values are POKEd into memory except for "jump" addresses needed by the IF statement and the GOTO statement. The array LL( ) stores each line number and the corresponding starting location in memory where its object code is stored. LL(1,1) is the first line number of your program, and LL(1,2) will be 49408 since that is where the first byte of object code is stored.

The compiler keeps another list of "jump" addresses in an array JT( ). This is called a jump table. JT(1,0) is the line number of the first line of source code containing a GOTO or an IF statement. JT(1,1) is the line number to which the jump is being made. JT(1,2) is the address of the object memory in which the referenced line number's addresses should be POKEd.

An example is essential. Consider this program:

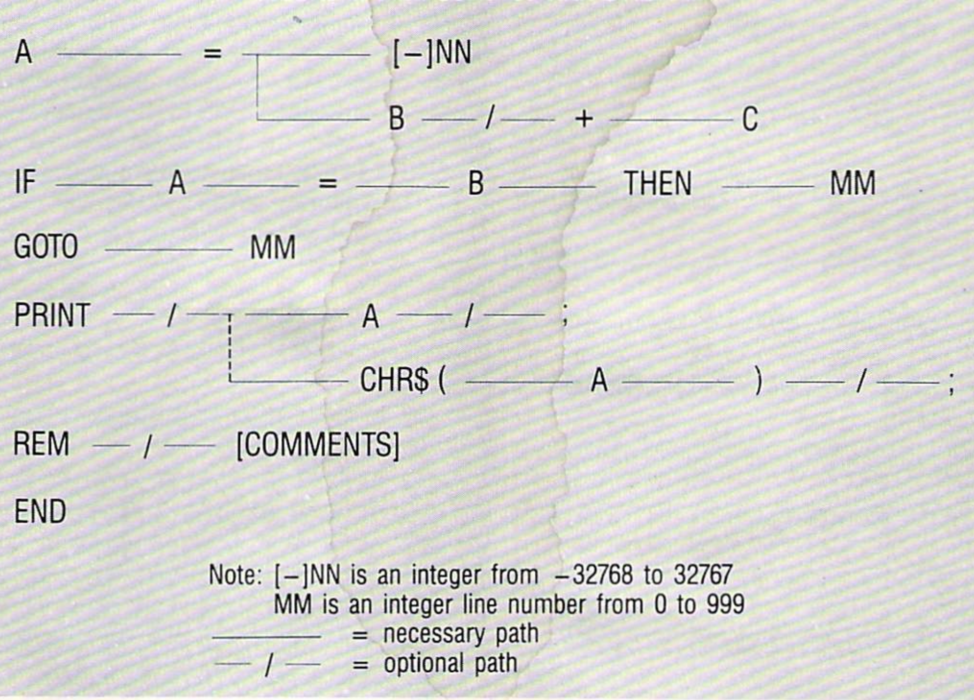
```
10 PRINT
20 GOTO 10
```

LL(1,1)=10 and LL(1,2)=49408 since object code for line 10 begins at address 49408. The PRINT statement uses 5 bytes (see lines 6020 and 6220-6240). Line 20 object code will start in 49413, so LL(2,1)=20 and LL(2,2)=49413.

The GOTO 10 statement in line 20 generates three bytes of object code as shown in line 5120. The second and third bytes (at addresses 49414 and 49415) must be filled with the object memory address of line 10. The values in the jump table are JT(1,0)=20, JT(1,1)=10, and JT(1,2)=49414.

The second pass of the compiler at line 2410 uses JT(1,1) to get the "target" line number which is 10. It scans LL( ) values to find the memory location of line 10 which is 49408. It then puts the least- and most-significant bytes of 49408 into locations 49414 and 49415. We will analyze this further next month.

FIGURE 1: MINI-COMP SYNTAX DIAGRAM



SEEING IS BELIEVING

After typing RUN 2000, you will see the first source code line number displayed on the screen. Then you will see the individual bytes read from that source line. Next you will see a memory address separated by a colon from the object code value as it is put into that location. This process will be repeated for each line of your program.

A message appears indicating the end of the first pass. Then there is a message at the end of the second pass. At this point, if there were no syntax errors, the object code resides in memory at address 49408. To execute the code, type SYS 49408.

If all goes well, you will see your program running at speeds almost too fast to be believable. If something goes wrong, hopefully you saved your program before you executed it. Track down the problem. Change the source code. Type RUN once more to test the source code in BASIC. Then type RUN 2000 to start the compilation process again. Then SYS 49408.

If you are familiar with assembly language, you may want to use a monitor program to view the object code in memory starting at $C100. Variable storage starts at $C000, but variable memory will not be filled until the compiled program is executed.

The sample program in lines 10 through 999 provides a very impressive demonstration of the compiler's power. The program takes nearly 16 minutes to run in interpreted BASIC. The compiled program takes less than 33 seconds, nearly 30 times as fast!

Indeed the source code is a hodgepodge of intertwined spaghetti with IF-THENs and GOTOs stumbling all over themselves. As we (or YOU) add capabilities to this compiler, we will reduce that deficiency, however. (IF A < B THEN ... would be nice.)

EXPANSION POSSIBILITIES

Limited as it may be, *Mini-Comp* will handle a surprisingly wide variety of programs. Furthermore, it is written so that you can modify and expand it as you wish.

In upcoming months we will add capabilities such as string variables, graphics, and floating point numbers. We will further discuss the inner workings of the compiler. Writing a compiler is an art. This humble beginning is just a doodle to give you some ideas. You may find that it is more fun to write your own compiler than it is to write BASIC programs to be compiled. The ultimate goal might be to expand *Mini-Comp* so that it is capable of compiling itself. □ ***SEE PROGRAM LISTING ON PAGE 68***

TIPS AHOY!

Continued from page 26

```
·1 PRINTCHR$(147)"LOADING COLOR FAST";
·2 FORJ=50000TO50079:READA:POKEJ,A:X=X+A:PRINT"*";:NEXTJ:PRINT:PRINT
·3 IFX<>10903THENPRINT"ERROR IN DATA[3"."]":END
·4 PRINT"DATA OK---SYS 5[4"0"] TOGGLES ON AND OFF[3"."]"
·5 DATA173,134,2,141,160,195,173,32,208,141,161,195
·6 DATA173,33,208,141,162,195,169,79,32,210,255,169
·7 DATA78,162,132,160,195,204,1,3,208,9,162,139
·8 DATA160,227,169,70,32,210,255,142,0,3,140,1
·9 DATA3,76,210,255,224,128,176,3,76,139,227,173
·10 DATA160,195,141,134,2,173,161,195,141,32,208,173
·11 DATA162,195,141,33,208,76,116,164
```

MACHINE LANGUAGE TRACER

The following routine diverts the IRQ vector at $0314 so that the current memory address is displayed 60 times per second. The value is displayed in hex on the top left of the screen. Type in the BASIC loader, save it, and run it. Immediately a series of hexadecimal numbers will be displayed on the screen. These are the addresses of the BASIC main input loop routine, as BASIC waits for you to type something on the keyboard. Running BASIC or ML programs, you will be able to monitor the actual addresses of the routines the computer is using to make your prograams run. It's a handy and quick machine language trace! Execution speed can be slowed down a little by pressing the CONTROL key. Holding down the COMMODORE key will slow down execution a lot, and freeze execution when released. Pressing CONTROL continues execution. Finally, holding down the SHIFT key also freezes execution. Try SHIFT LOCK for an excellent program execution freezer!

The following BASIC loader will install the routine in memory at address 828 for you, and activate it.

—Peter M.L. Lottrup
Buenos Aires, Argentina

```
·10 FORI=828TO1013:READA:POKEI,A:CK=CK+A:NEXT
·20 IFCK<>22127THENPRINT"DATA ERROR":END
·30 SYS828:END
·40 DATA 120,169,78,160,3,141,20,3,140,21
·50 DATA 3,88,169,1,141,245,3,96,186,189
·60 DATA 5,1,133,253,189,6,1,133,254,165
·70 DATA 254,168,201,16,176,14,169,176
·80 DATA 141,0,4,185,229,3,141,1,4,76,137
·90 DATA 3,162,0,56,233,16,201,16,144,4
·100 DATA 232,76,112,3,168,232,189,229,3
·110 DATA 141,0,4,185,229,3,141,1,4,165
·120 DATA 253,168,201,16,176,14,169,176
·130 DATA 141,2,4,185,229,3,141,3,4,76
·140 DATA 184,3,162,0,56,233,16,232,201
·150 DATA 16,144,3,76,160,3,168,189,229,3
·160 DATA 141,2,4,185,229,3,141,3,4,32
·170 DATA 159,255,172,141,2,192,1,240,246
·180 DATA 192,2,208,17,32,218,3,32,159
·190 DATA 255,172,141,2,192,2,240,4,192,4
·200 DATA 208,242,76,49,234,160,120,162
·210 DATA 255,202,208,253,136,208,248,96
·220 DATA 176,177,178,179,180,181,182,183
·230 DATA 184,185,129,130,131,132,133,134
·240 DATA 255
```

If you encounter difficulty entering an *Ahoy!* program, call our technical department at 212-239-6089 (if busy or no answer after three rings, 212-239-0855), Monday-Friday, 8:30-4:30 EST.

REVIEWS

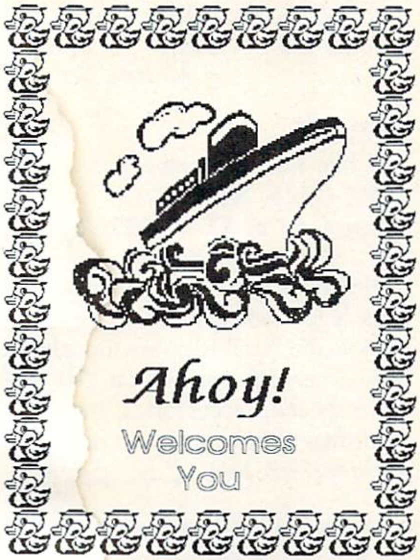
SESAME STREET PRINT KIT
PRINTPOWER
Hi Tech Expressions
Commodore 64
Price: $14.99

There is no shortage of greeting card maker programs for the C-64. These programs let you create signs, banners, greeting cards, and other items of this sort which can fit on a single 8½ by 11" sheet of paper. The *Sesame Street Print Kit* has two things going for it that none of the other programs have: the highly popular Sesame Street Muppet characters, and a very low price. For the adults in our audience, please note that this review also applies to the *PrintPower* program. The primary difference between the two packages is that the graphics supplied with the latter are not directed toward the younger set.

The *Sesame Street Print Kit* is a two disk set consisting of a program disk and a graphics disk. Since the disks are not copy protected, your first order of business should be the making of backup copies. This is particularly important as the program saves your most recent creation on the program disk. The second step is to configure the program for your printer. Since a wide variety of popular printers are directly supported, you should have no trouble finding one that works with your system. The setup also lets you pick a printer interface and an appropriate secondary address.

The graphics disk contains 60 images of the Muppets in a variety of poses and activities. Some of the graphic bit maps are quite large, with a substantial amount of detail. A score of border designs are also included, which gives you ample opportunity for creative edge treatment of your work.

For text you can choose from seven fonts which include the straightforward functionality of Avant Garde and Fine Print, the conventional Times and Headline, and the decorative Old English, Xmas (not included with *PrintPower*), and Zapf. All the fonts support both upper and lower case characters, and may be modified in one of six ways. The six font modifications consist of the conventional Bold, Italics, Outline, and Shadow, a jittery Jazz treatment, and Raised, a combination of Italics, Outline, and Shadow.



The activities supported by the *Sesame Street Print Kit* include greeting cards, signs, posters, flyers, letterheads, storybook pages (not in *PrintPower)*, and banners. *PrintPower* also offers the option to convert the company's *Award-Ware* graphics to its own format. All these items are based on single sheets of 8½ by 11" paper, except for the banners, which can be up to 42 pages long. The text sizes available for most projects are ⅜", ¾", and 1½" inches. There are 11 text sizes available for banners.

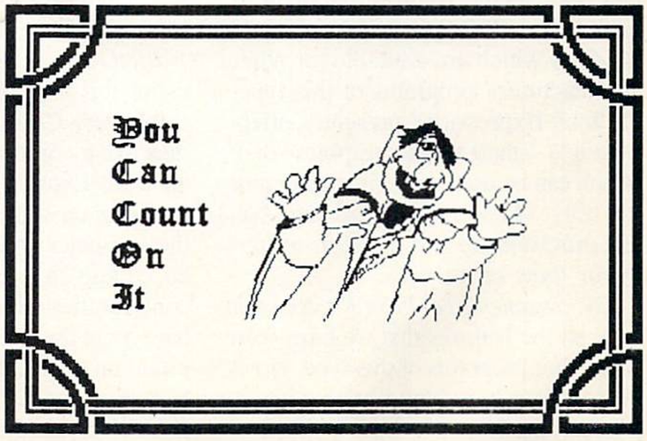


Greeting cards can be formatted as wide or tall with up to four sides, or as tents with only two sides. Signs or posters can be vertical, horizontal, or half sheets. The *Sesame Street Print Kit's* working screen consists of two parts. The upper half displays a graphic representation of the working page. This is only a schematic representation with graphics shown as blocks, and text shown as a series of lines. The lower half of the screen displays messages, disk contents, and the text editor.

If you are working with a single disk drive, be prepared for several disk swaps for each activity. The program alternates between loading graphic data and program modules both during the creation process and final printout. If you have two disk drives, the disk swapping can be avoided. Although up to eight disk drives are supported, we can't see the need for more than two. Keep in mind that the program uses drives 1 and 2 instead of the Commodore device numbers 8 and 9.

A second disk drive is especially useful during the printing process, which can take up to 15 minutes per page and which will require several disk changes. Printouts utilize the printer's double density mode when available. A draft printout in single

The **Sesame Street Print Kit** *includes more than 60 Muppet images;* **PrintPower** *provides more adult art. Each program accepts the other's graphics.* *READER SERVICE NO. 262*



density will save some time and printer ribbon during the layout process. Test printouts are likely when overlaying text on graphics, as the screen display cannot be used to determine the exact positions.

The text editor is of the single-line type, which is adequate for this type of work. Up to four fonts can be selected for a single design, but only one font per line is allowed. Text can be centered, justified, and sized. The text attributes are displayed alongside the ends of each line.

Since the most recent project is always saved to disk, it is possible to go back and create a series of personalized items. This will take some time, due primarily to the large amount of disk activity and the need to page through the entire project even if you are changing only one word. For example, it takes about five minutes to page through a four sided greeting card followed by 15 minutes of printing.

Although the subject matter is geared towards the younger set, it will take a keyboard-literate person to operate the program. The younger child will enjoy the opportunity to pick and choose his or her own graphics and fonts from the handy card included with the package. As a matter of fact, we found the young children in our test group to be quite definitive and opinionated about these matters. Your child will also be thrilled when the first printouts come buzzing out of your dot matrix printer.

Sesame Street Print Kit and *Print-Power* will accept each other's graphics disks. However, the graphics disks which are supplied with the programs are not available as separate items. If you wish to use the graphics from the other program, you will have to buy the entire package. This is not such a bad deal, as the whole program sells for less than the supplementary graphics disks which are available for other manufacturers' programs of this type. Hi Tech Expressions presently offers a single stand-alone graphics disk which can be used with either program for only $4.99. Neither package has any provisions to edit or create graphics or fonts on its own.

The *Sesame Street Print Kit* does not have all the features that we have seen with other programs of this type. However, it does have some unique qualities, not the least of which is the subject matter. When you consider the price, and if you have the right audience, this is not a program you can afford to pass up.

Hi Tech Expressions, 584 Broadway, Suite 1105, New York, NY 10012 (phone: 212-941-1224).

—Morton Kevelson

JIFFYDOS
Creative Micro Designs, Inc.
C-64, C-128, SX-64
Price: C-64 or SX-64 $49.95; C-128 $59.95

Please excuse us while we wipe some egg from our collective faces. Back in the April issue we thought we had cornered the market on 1541 disk drive speedup accessories, but some items managed to get by us (no doubt while we were looking the other way).

Each *JiffyDOS* package consists of a custom pair of Kernal ROMs: one ROM for the C-64 or C-128, and one ROM for one of the following disk drives:

1541	FSD-2
1541C	1581
1541-II	MSD-1
1571	MSD-2
FSD-1	Bluechip 1541

The SX-64 package contains one chip for the computer and one for the built-in drive.

No sooner had the April issue hit the stands than we received a call from Charles Christianson, VP of Marketing at Creative Micro Designs, who in somewhat accusatory tones inquired as to the omission of his company's products from our report. We pleaded ignorance (no excuse in the eyes of the law and our readers) and asked for some samples. Here are the results.

JiffyDOS, as can be seen from the list on this page, is available for practically every C-64 and 1541-compatible disk drive combination you can come up with. Each *JiffyDOS* package consists of a custom Kernal ROM set for the computer and one disk drive. Just be certain to specify your hardware configuration when ordering. If you have more than one disk drive, you can order an extra disk drive ROM for $24.95. Each *JiffyDOS* Kernal ROM actually contains a copy of the computer's or disk drive's original ROM plus the *JiffyDOS* version of the ROM. The 1571's ROM manages to contain the original code as well as *JiffyDOS* in the same size chip as the original.

Installation does require that you open up your computer and disk drive. The original Kernal ROMs have to be located, removed, and replaced with the *JiffyDOS* Kernal ROM adapter board. If your original ROMs are soldered in place, the removal job should be tackled by someone skilled in the surgical removal of multipin integrated circuits. Otherwise the installation is simply a matter of prying out the old chips and pressing in the new chips. Except in the case of 1571 installation, you will also have to install a small toggle switch in the computer and the disk drive. This allows you to manually switch between the original Kernal and the *JiffyDOS* replacement Kernal.

The switch can be left dangling from its pair of thin wires out of an unused port. The best approach is to drill a small hole in the plastic case and permanently mount the switch. The 1571 disk drive does not need a switch, as its *JiffyDOS* Kernal automatically senses when *JiffyDOS* is active in the computer and selects the appropriate drive routines. The SX-64 version only requires a single switch, which performs its function for both the computer and its built-in disk drive. Actually, only a single switch is required for any of the installations, even for multiple drive systems. However, a single switch would also necessitate a pair of connecting wires between each piece of equipment. If you are technically astute and do not mind the extra wires, you should be able to perform this modification on your own. Of course, you will be doing this at your own risk. We have not tried this ourselves and can assume no responsibility for what you may do to your system. So there, you have been warned.

We ran our tests of *JiffyDOS* using a version for the SX-64 with its internal disk drive and using a version for the C-128 with the 1571 disk drive. The tests using the 1541 were actually done with the C-128 in C-64 mode and with the 1571 in 1541 mode. One side effect of the C-128 installation is that the *JiffyDOS* replacement ROMs contain a copy of the latest upgrades from Commodore for their respective ma-

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chines. We ran a series of speed tests LOADing and SAVEing a 150 block program file, and the results have been summarized in the following table:

	W/O *JDOS*	With *JDOS*
1541 LOAD #1	96	18
1541 SAVE	96	39
1541 LOAD #2		7
1571 LOAD #1	18	18
1571 SAVE	71	39
1571 LOAD #2		7
SX-64 LOAD #1	96	19
SX-64 SAVE	102	42
SX-64 LOAD #2		11

We listed two LOAD times for each disk drive. The first LOAD time is for a file which was SAVEd using the standard DOS, that is, without *JiffyDOS*. The second LOAD time is for the same file which was reSAVEd using *JiffyDOS*. The notable improvement in the LOADing time for the file SAVEd in *JiffyDOS* format is due to the optimized sector filling sequence used by *JiffyDOS*. The first LOAD was done from a full disk with the test file near the end of the directory. The SAVE test and the second LOAD test were done using a freshly formatted disk with *JiffyDOS*. The actual performance for any disk speedup utility will depend on the prior history of the disk, with factors such as free space, number of files on the disk, the order in which files were saved, and the number of files which have been erased playing an important part.

The values shown here can be used as a relative guide as to how *JiffyDOS* can improve disk drive performance. Keep in mind that *JiffyDOS*' effective performance will improve the longer you use it, and as the proportion of the files on your disk which were SAVEd with it increases. Note that file copying a disk with *JiffyDOS* active may not do the trick. Some copy utilities ignore the DOS and use their own sector filling sequence. *Fast Hack'em* is one example of a utility which works in this way.

When *JiffyDOS* is active, the computer;s sign-on screen will contain an added message indicating that it is in effect. If you read the disk drive's error channel after power on or after a disk drive reset, the drive will also indicate the presence of *JiffyDOS*. The only penalty associated with *JiffyDOS* is the loss of the cassette routines. *JiffyDOS* uses the space which was occupied by the cassette drivers for its own routines. This allowed *JiffyDOS* to fit in the same size ROM as the original Kernal. We feel that very few users, if any at all, will miss the cassette routines while *JiffyDOS* is active.

In addition to the speedup functions, *JiffyDOS* also incorporates a full-featured DOS wedge. The wedge is very similar to the DOS 5.1 wedge supplied with the 1541 disk drive, but with some notable enhancements. It includes the ability to LIST a BASIC program or a PETSCII text file to the screen, or printer, directly from disk without affecting the current contents of the computer's memory. *JiffyDOS* can also perform a simple text screen dump to a Commodore-compatible printer. The computer's function keys are conveniently defined (redefined on the C-128) with some frequently used commands. C-128 users may find the redefined keys somewhat confusing at first, as they don't match that computer's default configuration.

Overall, *JiffyDOS* presents an excellent performance for what is essentially just a ROM upgrade for the computer and the disk drive. By restricting the modifications to just a ROM swap, *JiffyDOS* does not tie up any of the computer's expansion ports. The retention of the original ROM code, along with an easy way to switch between the two, insures that you will not have any unsolvable compatibility problems with any of your existing software and peripherals.

Creative Micro Designs, Inc., P.O. Box 799, Wilbraham, MA 01095 (phone: 413-589-7624).

—Morton Kevelson

SUPER AIDE
Free Spirit Software, Inc.
Commodore 64
Disk; $29.95

Super Aide is a collection of C-64 programming utilities. Its functions fall primarily into two areas—improving access to disk files (DOS wedge) and providing useful new tools for programmers.

Roots in Public Domain

Stephen Gast and Richard Rollins are the authors of *Super Aide*. Or perhaps we should say they are the compilers and editors. *Super Aide* finds its heritage in existing public domain software. What its authors have done is take some of the best PD software for C-64 programmers, integrate it, improve it, and package it into a fine set of programmer's tools.

Many of the PD ancestors of *Super Aide* have well-deserved reputations among C-64 programmers. The original version of *Super Aid* married David Hook's *Tiny Aid Plus* to Bob Fairbairn's *DOS Wedge*. (*Tiny Aid Plus* was itself descended from *Tiny Aid* by Jim Butterfield and *BASIC Aid* by David Seiler.)

Improvements in the second version of *Super Aid* were inspired by Michael Keryan's program *Does-It*, which you may know by the name *DOS Plus*. That version added some of the utilities we will review later as RESTORE commands. Both versions 1 and 2 of *Super Aid* are in the public domain.

Version 3.2 of *Super Aide* (yes, they intentionally spelled Aide with an "e") is the new version reviewed here. In addition to the features of earlier versions, it also contains a modification of Bob Swift's *Screen 40.3*. Other PD programmers who deserve credit in this package are Kevin Hopkins, who did the scroller, Michael Keryan, who wrote the separate hi-res screen dump, and Kevin Hisel, whose *Disk Doc Deluxe* is included.

You should be able to find most, if not all, of these programs in the PD library of a user group or scattered on various C-64 bulletin boards. What you won't find by collecting each and every program above is the functionality that *Super Aide's* authors have lovingly added. Even if you are willing to settle for a disk full of separate PD programs, you might have trouble collecting all these for less than *Super Aide's* $29.95 price tag.

How It Works

Super Aide is a disk-based program that loads into and resides in your C-64's memory so it is accessible as you program. That may scare some BASIC programmers who fight for every byte of RAM they can get.

No problem. *Super Aide* loads into segments of your computer's RAM where it does not reduce memory available to your program. (Your C-64 ac-

tually has 84K of RAM and ROM. The 6510 chip can switch 4K blocks of memory in and out to give you access to memory beyond the 64K allowed at any one time. The addresses from $A000 to $BFFF, under BASIC, and from $E000 to $FFFF, under the I/O and the KERNAL, can be separately banked in and out of the microprocessor's address space. By switching memory back and forth like this, a utility like *Super Aide* can be available to you while you are programming.)

When you load *Super Aide*, it gives you a couple of options to select. The PD program *X-Mon 64*, a machine language monitor, can be loaded in either of two memory locations. Or a nice low-res screen editor can be loaded along with *Super Aide*.

X-Mon 64 has all the functions of a simple assembler/disassembler. If you do any assembly language programming, you are probably familiar with it. If you would like to program in assembler, this is a good tool with which to start.

The low-res screen editor is a fine utility that compiles the current screen into a BASIC listing. When you first enter the editor, you can change screen colors and edit the contents of the screen to your heart's content.

You may want to load *Super Aide* with other programs. Because it is a programmer's utility, it should be 100 percent compatible with BASIC, and it works fine with the PAL assembler. Likewise, many 1541 fast loaders will work with it. The program warns you away from CHRGET wedges, though.

When you start using *Super Aide*, you see the care that went into its design. Whether it's the complimentary colors for BASIC line numbers or the bidirectional scrolling through your listing, something is bound to impress you. If you really want to be sold, try editing a "packed" BASIC line.

But What Has It Done for Me Lately

It is impractical to cover every one of *Super Aide's* nearly 50 commands in a review. But here are some of the highlights.

The wedge commands, which average about three keystrokes, give you a shorthand for most drive operations. Directory, initialize, status, load, and a host of other commands are available. You can completely reformat a disk, or save time by just rewriting track 18 and updating the BAM. You can also reset device numbers, and duplicate disks on dual drive systems.

Several of the wedge commands can be typed to the left of the block count in a directory listing. You do not have to type or delete anything else on the line – a real timesaver. One especially nice command will, with one keystroke, list a program, sequential, relative, user, or deleted file. Program files are properly formatted as they are listed.

Most of *Super Aide's* programming utilities are initiated with the RESTORE key. Hit it and the computer's current task will be halted while you access over two dozen useful commands. They do things like change screen colors, make the printer echo what is printed to the screen, give the starting and ending address and length of program files, or unerase a "NEWed" program. You can also turn on a trace function that shows line numbers and commands while it steps through your program.

Ever lose track of variables? Two keystrokes and *Super Aide* will list them all for you. Another simple command will give the location of the start of the variables pointer. Or you can define the function keys. Or look at an individual record in a relative file.

Another *Super Aide* utility will renumber all or part of your program, including GOTOs, GOSUBs, etc. Then there are my favorites – a command to search for a string in a BASIC program and a command to automatically replace any string throughout the program or in any part of it. The list goes on and on.

Two non-integrated utilities are included. The hi-res screen dump is for non-Commodore printers. It comes set up for Epson/Gemini printers and Cardco interfaces. If you have a different printer, you will have to modify a few lines that contain lots of REMarks to help. *Disk Doc Deluxe* lets you view and edit individual sectors on any disk. It has a few nice extras, like being able to trace a chain to the end.

Documentation Dilemma

The one area in which *Super Aide* fails is documentation. Its 32-page manual is just a duplicate of the 55 screens of documentation on the disk. The onscreen documentation can be read when you first load the program. For onscreen documentation it's fine. But in print, I would like to see more detail and suggestions on efficient use, maybe even a trick or two.

Although the onscreen documentation cannot be RAM-resident, two help screens that contain all the DOS wedge and RESTORE commands are. With these two help screens, every function of *Super Aide* will always be at your fingertips.

Other than improving the manual, the only change I would suggest is a way to set up defaults to automate loading *Super Aide* so all five initial screens do not have to be viewed. So far, there's been only one unexpected glitch with *Super Aide* – getting it to recognize a 1541 drive as device 9 on a C-128/1571 system.

You can find many of the individual components on *Super Aide* in the public domain, but you won't find any one program this well-integrated or this useful.

Free Spirit Software, Inc., 905 W. Hillgrove, Suite 6, LaGrange, IL 60525 (phone: 800-552-6777 or 312-352-7323). *–Richard Herring*

HOME DESIGNER
Free Spirit Software, Inc.
Commodore 64
Disk; $49.95

Anything worth doing is worth doing well, and if you wanted to design a home you'd be well-advised to work with a CAD (Computer Aided Design) program rather than with pencil and eraser. The obvious benefits would be automatic scaling, the ability to delete and redraw any lines not correctly placed, and the ability to automatically draw perfectly proportioned circles, squares, and arcs.

You would also want to be able to work with layered drawings, where a drawing of the plumbing arrangements could be superimposed at will over a drawing of the general floor plan and where an electrical schematic could be superimposed over both.

You'd want to be able to add text labels to your drawing, and you'd also want to be able to zoom in on specific parts of the drawing in order to render finer detail. Furthermore, you'd want to be able to draw an object such as a window and be able to relocate it at will, and be able to copy it so that you don't have to draw every window from scratch.

You'll find most of these options in *Home Designer* for the C-128, but whether you can actually use them to design a home–or anything else–is a matter of opinion.

Because the C-128 does not do well with graphics in the 80-column mode, you'll need a monitor such as Commodore's 1902 that can switch to a 40-column mode quickly and easily. You'll also want a joystick with a rather free movement, for it is with this that you'll do most of your drawing.

In beginning the program, you should first configure it for the type of printer or plotter you'll be using, and also specify whether you wish to use one or two disk drives. This is one of the few software packages that allow the use of two drives, but unfortunately it does not support the 1571 drive's ability to read and write double-sided disks: you'll still have to flip the disks.

Your working screen holds a bordered area that consumes about one half the monitor, representing a piece of paper measuring 22 x 16". This is twice the size you normally have in your printer, but it can be scaled down during printing. The result is a very small easel for drawing your plans, meaning large plans will have to be drawn small (though the Magnify option will help in this). This is the first of several drawbacks in the program. On the right border of the screen is a vertical list of commands, and the area below the defined square is reserved for a written record of the commands you give.

Home Designer may best be thought of as a graphics database, and in this aspect it strives to emulate the best of CAD programs. Unlike standard drawing programs, a square is not seen or saved as a square but as a series of redefinable points connected by lines–an object rather than a bit-mapped picture. As a result of this system, a square can be moved from one part of the screen to another, and so far as the program is concerned, you've merely rearranged a few files in a database.

To carry the analogy a bit further, you've removed a card from one file drawer and placed it in another. The location has changed, but the card with its original information is still intact. This, of course, is in comparison to standard drawing programs in which the card cannot be moved.

With cursor keys or joystick, you move your crosshair cursor to the vertical list of commands and select "Insert." Now a submenu appears, showing the things you can insert: lines, horizontal lines, vertical lines, squares, circles, and arcs. Select an option by placing the cursor on it and clicking, then return the cursor to the drawing area and click again. Since "Line" is easiest to describe, assume we've chosen that option.

In the area below the screen, the word "Loc:" appears. Click once again, and this will be followed by "D," which is an indication that you've pressed the fire button. The starting location for your line has now been defined, and a cursor is flashing in the drawing area. Move the crosshair and click again, denoting the ending point, and after a slight pause a line appears between the two points.

Although it is now possible to go on drawing lines for as long as we want, any changes involve pressing RETURN, which takes you back to the master menu where you'd select "Insert" and then select the next option you wish to use. This becomes one of the drawbacks to the program, but we'll assume it has to do with the limitations of the C-128.

As a "typical" user, one more interested in what a computer can do for me than in what I can do for it by programming, I find little value in seeing the program being written below the easel. Though I'm sure it's necessary, I would rather it had been hidden and the space used to enlarge the easel.

Drawbacks less easily dismissed are the imprecisions involved in using a joystick for drawing. Never have I been able to place lines exactly where I want them to be, and the situation is not remedied by the Commodore mouse, which can also be used. Probably the most precise way of drawing is to specify the starting and ending coordinates of a line and typing them in on the keyboard: "X10Y8,X15Y20 (Ret)". However, if you're smart enough to draw figures in this way, you're

probably a design engineer with access to far more powerful CAD programs.

(In using the keyboard, certain of the more common commands—such as INSERT—are assigned to the function keys, and this does seem to make the overall operation a bit faster.)

Another drawback is in the use of library images—figures such as windows and water closets that are predrawn and need only to be inserted in your drawings. Flip the disk over and use the directory command to see what's available, then return to your drawing board and try to call up an image. In my attempts, the program simply locked up.

In fact, I experienced several lockups—screens or areas from which I could not escape without rebooting the computer. In light of this, my best advice is to save your work frequently to avoid total losses.

Printing of an image is done from the opening menu, which means you must first save a drawing and then exit and reboot before you can print. Once a drawing has been loaded, you'll be asked to specify which layers you wish printed, the scale of the printing (a scale of .05 will print the 22 x 16" easel sideways on a sheet of 8½ x 11" paper), and whether you wish to print in draft or high resolution graphics.

My Panasonic 1092 is supported by both graphics modes, the draft being 72 x 120 dots per inch and hi-res being 216 x 240 dpi. The primary difference is in the printing of vertical lines (vertical here in the sideways printout; horizontal in your drawing). In draft, these lines are broken; in hi-res, a series of tiny linefeeds renders them as solids.

Printing is the area in which *Home Designer* lives up to its full potential. The output of even a dot-matrix printer looks as good as many plotters. For those who would prefer using the latter, the CBM 1520 and H-P 7470A plotters are supported by the program.

Documentation for *Home Designer* is good, and it will take some practice and memorizing before you have all the abbreviations down pat. A jarring note is the way the author frequently inserts first-person observations and opinions into what should be an impersonal "how-to-do-it" book.

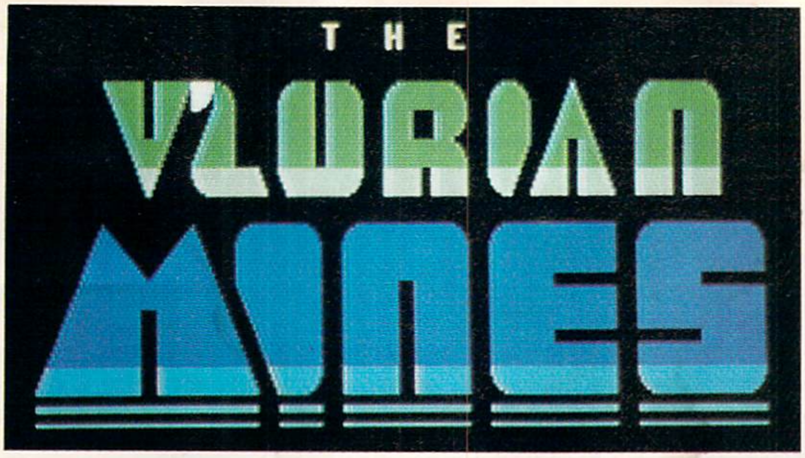
In evaluating any software, I try to measure a program by what it attempts to do and how well it succeeds in doing it. The key to *Home Designer's* aims is probably embodied in the title: You might use it to design your dream home or a room addition so that you could give the printed copy to an architect for final rendering; in this it should be thought of as having the ability to produce first drafts. It is not the type of program you would use if your aim were to design a supersonic aircraft, nor does it pretend to be.

But even on that level, my overall opinion is that *Home Designer* is a fine idea whose time has not yet come. Though the effort—creating a full-featured CAD program for the C-128—is noble, the execution—making it reliable and easy to use—is not. With any luck at all, perhaps the programmer will return to his computer and produce version 2.0 without the bugs and with a better user interface.

Until that occurs, we'd recommend buying this one only if you are dismayed by the lack of equivalent software for the C-128.

Free Spirit Software, Inc., 905 W. Hillgrove, Suite 6, LaGrange, IL 60525 (phone: 800-552-6777 or 312-352-7323).

—Ervin Bobo

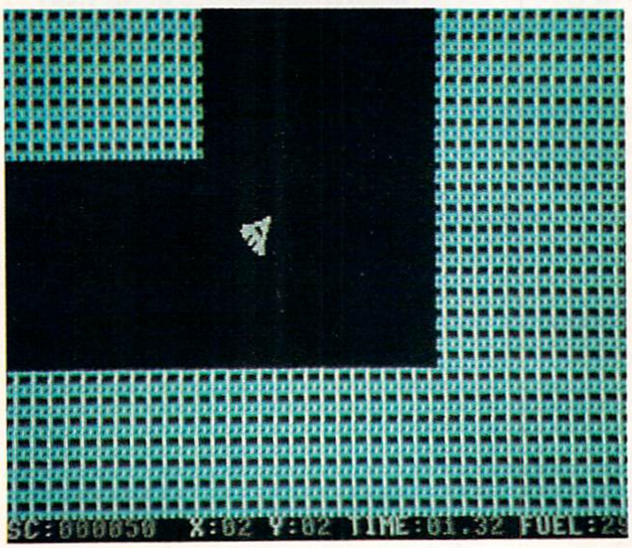


For the C-128

By Mike Hoyt

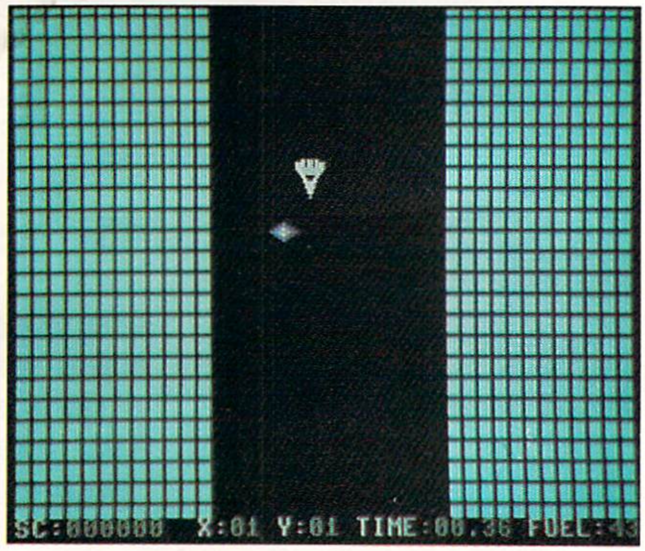
Your small spacecraft sits motionless before the entrance to the great V'lurian Mines, renowned for their wealth of pure arconium crystals that carry a high price in the markets. Being a space pirate (or "soldier of fortune" as you prefer to call yourself) has allowed you to amass great wealth in the past. Yet you realize that you cannot resist the lure of the Mines....

As the pilot of the shuttlecraft Aniteon, you must seek out and capture the remaining crystals in the mines. As you might have expected, the V'lurians have set up a defense system of satellites that orbit around the mines at high velocities. To defend yourself, the Aniteon has been equipped with the latest in high-capacitance discharge defense shields.



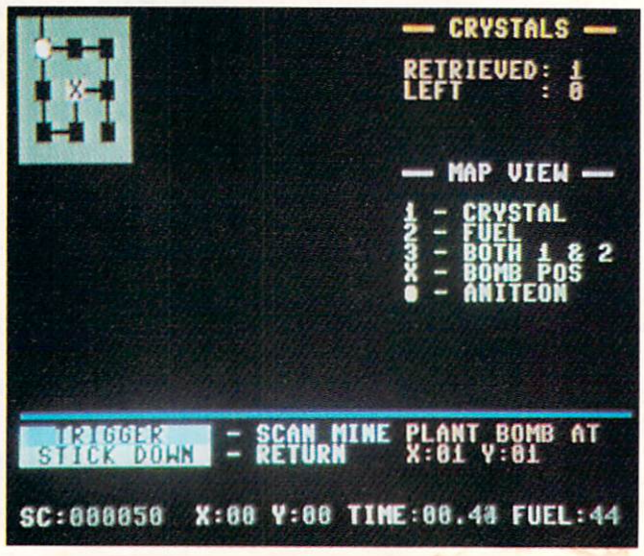
The Aniteon's low-power ion propulsion engines will allow you to navigate the narrow passages of the mines while using the smallest amount of what little fuel the Aniteon can carry. Also on board is a single anti-matter bomb that you will use to destroy each mine once you have extracted its crystals.

The V'lurian Mines is a strategy/action game for the Commodore 128. It is written in BASIC and relies on several machine language routines to make it a very fast paced game. After you have saved a copy, type RUN and press RETURN. In a few seconds the title page will scroll down the screen and a short music theme will begin playing. If you press the space bar or let the music finish playing, the next page will scroll onto the screen, presenting you with three op-



tions. Pressing F1 will start the game at the level indicated at the bottom of the screen. F3 and F4 will increment or decrement the starting mine level. Level 1 is small and easy to complete, while level 10 is large, complex, and far more challenging. If you want to exit to BASIC, simply press the F7 key.

Once you have started the game, the screen will blank for a few seconds (there is a longer delay for higher levels) while the mine is created. When it is done, you will be told which mine level you are about to enter and the number of crystals in that mine while an alarm sounds in the



PHOTOS: MICHAEL R. DAVILA

background. Then an overhead view of the upper left portion of the maze will cover the entire screen with your ship in the center.

Pushing the joystick left or right will rotate your craft to the left or right. When you apply thrust by pushing the joystick forward, the ship will move in the direction it is facing. At the start of each level, you are at the entrance to the mine. If you pilot your ship through the opening at the top of the screen, you will have exited the mine. Navigating your ship through any of the other exits will cause a new screen to appear. There are many interconnecting screens that form each mine's maze.

While you are exploring the mines, avoid any contact with the orbiting satellites and the mine's walls, as their touch will destroy the Aniteon. If you are threatened by one of them you may activate your shields by pressing and holding the fire button until the danger has passed. Be aware that your shields drain your fuel rapidly. If the need ever arises, you can press the space bar to destroy all satellites in the section of the mine you are currently in. However, this tactic burns 10 units of fuel, so it should be used sparingly, if at all. Remember, you have only one ship; be *very* careful.

The arconium crystals appear as small multicolored diamond shapes which you can capture by touching them with your ship. Fuel cannisters appear as red squarelike shapes. Gathering one will raise your fuel supply, thus prolonging the time you can search the mine for crystals.

If you pull back on the joystick when there are no satellites in your area, a map display will appear. In the upper left corner of the screen is a graphic representation of the entire mine that you are in. The Aniteon is represented by a white circle. If you press the fire button, the map will show the location of all crystals and fuel cannisters. Five units of your fuel are needed to activate the scanners, so do it only when you are having trouble finding crystals.

After you have captured all the crystals (or as many as you dare), you should determine where to place your bomb. An X on the map display shows where you should set your bomb to best devastate the mine. If you do not set the bomb at all, your score will drop by 1000 points after you leave the mine. If you set it at any place other than where the map indicates, the mine will only be partially destroyed and you will lose 500 points. To set the bomb, press the B key. Be certain you're not in the center of the screen when you set the bomb, as that is where it will appear. After it is set, the timer at the bottom of the screen will reset and begin counting. You must then leave the mine as quickly as possible. If the timer reaches the number of seconds shown on the map screen, the bomb will detonate. Once the bomb is set, there is no way to disarm it.

When you have exited the mine, a screen will show any bonuses or deductions that you have earned for that level. Pressing the fire button will allow you to progress to the next level of the treacherous V'lurian Mines. ☐

SEE PROGRAM LISTING ON PAGE 71

COMMODARES

PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Put *your* name and address on the listings as well. Show sample runs if possible. Briefly describe your solutions and tell what makes them unique or interesting, if they are. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares!*

PROBLEM #57-1: QUICKLY RANDOM

This problem was suggested by Justin Smalley (Boulder, CO). Start with this ordered X( ) array:

```
10 DIM X(100): FOR J=1 TTO 100: X(J)=J:
NEXT
```

Add a program which will rearrange the X( ) array in random order. Make your program as fast as possible. Speed is of the essence.

PROBLEM #57-2: TEAM PLAY

I have received several requests for this type of program, although we have handled a similar problem in previous *Commodares.* Dale Goupell (Alpena, MI) wants a schedule for his 10 teams. The season is 18 weeks long, divided into two halves each 9 weeks long. Each team is played once each half season. Each team is played once at home and once away in the season. Create a schedule for the teams.

William Slupe (Boise, ID) needs a slightly more complicated schedule. We will make it the advanced challenge. Twelve people play tennis doubles, three sets a week for 12 weeks on three different courts. Each set consists of two teams with two players on each team. The order of priorities: 1) There are no fixed teams. Create as many combinations of player pairs as possible. 2) Try to have the players change courts, partners, and opponents to the greatest extent possible. Print out a schedule for these 36 sets. For example, Week 1 – Set A may match players 1 and 2 against 9 and 10 on Court 1, players 5 and 6 against 7 and 8 on Court 2, and players 3 and 4 against 11 and 12 on Court 3. Set B should have different team arrangements, different opponents, with players on different courts, if possible. Send your printouts of these schedules.

PROBLEM #57-3: SIMPLE ADDITION

After the workout in the previous challenge, you might enjoy this little one from Necah Buyukdura (Ankara, Turkey). Given this DATA statement:

```
10 DATA 9, 85, "4,356", "13,765", "759,2
15"
```

write the *shortest* possible program to read the six amounts, then calculate and print their sum. The last three amounts are specifically given in string form containing commas. Necah sent a one-line solution.

PROBLEM #57-4: SCREEN SAVER

Allistair McPhee (Melbourne, Australia) suggested this challenge. Write a program which saves the C-64 high resolution screen on tape or disk. He wants the starting and ending addresses stored as variables so the location of the screen can be changed. C-128 users should send solutions for their machines as well.

This month we will discuss the best solutions to *Commodares* from the March 1988 issue of *Ahoy! Problem #51-1: Unlisted Numbers* was submitted by Douglas Raynor Jr. (Ft. Benning, GA). The problem was to write a BASIC program which can be added to another program, making it possible to LIST the program.

True to form, the ingenuity of *Commodares* readers came forth. Donald Pellegrini (Arroyo Grande, CA) and Zeek of Lompoc, CA sent variations on the "5 colon unlist" procedure. The main problem with their solution is that every line of your BASIC program must have five colons immediately after the line number. The procedure then steps through each line of your program using the BASIC line pointers, replacing the first colon of each line with zero. Now the program is unlistable. Go back and restore each leading colon, and the program can be listed once again.

Less cumbersome is this solution from Craig Ewert (Crystal Lake, IL). Add line 0 to your C-64 program:

```
0 REM XXXX
```

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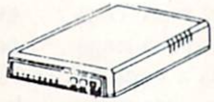
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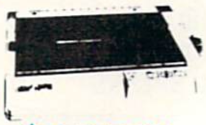
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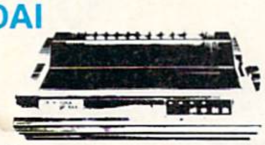
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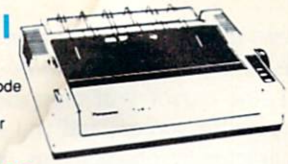


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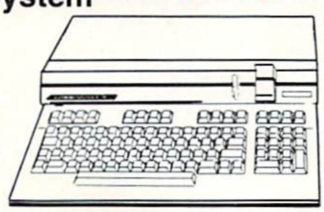
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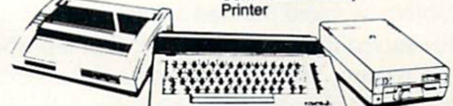
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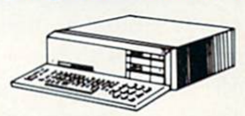
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Then in direct mode enter the following statements:

```
FOR M=2053 TO 2056 : POKE M,20 : NEXT
(Return)
POKE 2057,31 (Return)
```

This allows the program to be listed invisibly. Even the cursor vanishes to the background color. If you press CONTROL-2, the cursor will reappear white. Now move the cursor up on the screen, and you can reveal the listed program character by character as the cursor passes.

Larry Schafer (Westphalia, MI) sent not one but two solutions to this problem. Solution #1 for the C-64 is this one-liner added to the top of your program:

```
1 FOR M=40960 TO 49151: POKE M,PEEK(M):
NEXT: POKE 42652,96: POKE 1,54: POKE 792
,193: END
```

Larry said that this program copies BASIC ROM into RAM, disables the LIST command by putting a machine language RTS command (96) at the beginning of the ROM LIST routine, and then switches in the RAM BASIC and disables the RESTORE key. You can reenable the RESTORE key by entering POKE 792,71. RUN/STOP + RESTORE returns everything to normal.

Larry's second solution works for both the C-64 and the C-128. Very simply, POKE 775,0 to disable LIST. It is a good idea always to PEEK at any location before you POKE it so you can later restore its value. On the C-64, PRINT PEEK(775) gives 167 as the normal value. On the C-128, address 775 normally stores 81. To reenable LIST, POKE 775,167 on the C-64 or POKE 775,81 on the C-128.

The C-64 briefly shows the first line number of the program and returns to the READY prompt after you enter LIST. Entering LIST on the C-128 puts you into the MONITOR. To return to BASIC, press X and RETURN.

Problem #51-2: Double Sort was suggested by Don Monson (White Rock, BC). The goal was to alphabetize the letters within each word in a list, then to sort the resulting "alphabetized" words by length.

The problem as stated puzzled a few readers. Jim Speers (Niles, MI) solved this as a triple sort: first alphabetize the letters of each word, then sort the words alphabetically, and finally sort words of equal length alphabetically. Jim's program is shown here:

```
•1 REM ====================================
•2 REM    COMMODARES PROBLEM #51-2 :
•3 REM        DOUBLE SORT
•4 REM    SOLUTION BY
•5 REM        JIM SPEERS
•6 REM ====================================
•100 DIM W$(20),S$(20)
•110 N=N+1: IF N>20 THEN N=N-1: GOTO 140
•120 INPUT"ENTER WORD";W$(N): IF W$(N)="[
 UPARROW]" THEN N=N-1: GOTO 140
•130 GOTO 110
•140 FOR I=1 TO N: S$(I)=W$(I): NEXT
•150 FOR I=1 TO N: X$=W$(I): L=LEN(X$): I
 F L=1 THEN 200
•160 FOR J=1 TO L-1: FOR K=J TO L
•170 IF MID$(X$,J,1)<MID$(X$,K,1) THEN 19
 0
•180 T$=MID$(X$,J,1): MID$(X$,J,1)=MID$(X
 $,K,1): MID$(X$,K,1)=T$
•190 NEXT K,J: W$(I)=X$
•200 NEXTI:FOR I=1 TO N-1:FOR J=I+1 TO N
•210 IF LEN(W$(I))<=LEN(W$(J)) THEN 230
•220 T$=W$(I): W$(I)=W$(J): W$(J)=T$: T$=
 S$(I): S$(I)=S$(J): S$(J)=T$
•230 NEXT J,I: FOR I=1 TO N-1: FOR J=I+1
 TO N
•240 IF (W$(I)<W$(J)) OR (LEN(W$(I))<>LEN
 (W$(J))) THEN 260
•250 T$=W$(I): W$(I)=W$(J): W$(J)=T$: T$=
 S$(I): S$(I)=S$(J): S$(J)=T$
•260 NEXT J,I: PRINT"[s S]": FOR I=1 TO N
 : PRINT W$(I)TAB(18)S$(I): NEXT
```

This program is for the C-128. C-64 users must replace the statements containing MID$ on the left side of the equal sign in line 180:

```
MID$(X$,J,1)=MID$(X$,K,1)
```

and

```
MID$(X$,K,1)=T$
```

with the following:

```
X$=LEFT$(X$,J,-1)+MID$(X$,K,1)+MID$(X$,J
+1)
```

and

```
X$=LEFT$(X$,K-1)+T$+MID$(X$,K+1)
```

The first statement replaces the Jth character in X$ with the Kth character in X$. The second statement substitutes T$ for the Kth character in X$.

The user enters up to 20 words or enters "Up Arrow" if fewer than 20 words are used. Lines 150-200 sort the

letters within each word. Lines 200-230 sort these "alphabetized" words by length. Lines 230-260 sort the "alphabetized" words alphabetically with line 240 skipping the sort if the words are not the same length.

Line 260 displays the alphabetical list of alphabetized words with the longest words last. The original word is shown next to its alphabetized version. "YES COMMODARES ARE FUN" becomes "AER ESY FNU ACDEMMOORS." (But they aren't always easy.)

Problem #51-3: Squared Circles was submitted by Ernie Turner (Columbia, MS). The problem is to fill a 3-inch square with as many ½ inch diameter circles as possible. The circles must not overlap. You are to find the total amount of unfilled space.

Some "packing problems" such as this are difficult to solve in general. It turns out this one has an easy solution. Jim Borden (Carlisle, PA) said the only tough part was in proving that the problem is easy. Jim sent the following impressive graphics program for the C-128.

```
·1 REM ====================================
·2 REM    COMMODARES PROBLEM #51-3 :
·3 REM        SQUARED CIRCLES
·4 REM    SOLUTION BY
·5 REM        JIM BORDEN
·6 REM ====================================
·10 COLOR 1,1: COLOR 0,13: COLOR 4,12
·20 MC=0: FOR Z=0 TO 5: READ VS,HS: GOSUB
 50: NEXT
·30 DATA 500,500,433,500,416,555,390,625,
 357,714,277,833
·40 GRAPHIC CLR: PRINT"[CLEAR]UNFILLED AR
EA="3*3-([PI]*.25*.25*MC)"SQ. INCHES.":E
ND
·50 IF Z THEN SG=HS/2: REM STAGGER STEP
·60 R=-1: CC=0
·65 GRAPHIC 1,1: SCALE 1,3010,3020
·70 FOR X=250 TO 2750 STEP VS: R=R+1
·80 FOR Y=250+(R AND 1)*SG TO 2750 STEP H
S
·90 CIRCLE 1,Y,X,250,250
·100 CC=CC+1: NEXT: NEXT: IF CC>MC THEN M
C=CC
·110 CHAR 1,5,5,"TOTAL CIRCLES="+STR$(CC)
 ,1: GETKEY A$: RETURN
```

C-64 users could modify the program to run without the graphics statements, but it is difficult to know what the program is doing without seeing the circles being drawn.

It turns out that a 6 by 6 arrangement of the circles gives the optimal packing with 1.93 square inches unfilled as printed by line 40. Jim's program shows 6 rows of 6 [36 total circles], as well as these "honeycomb" arrangements: 6-5-6-5-6-5 [33], 7 rows of 5 [35], 5-4-5-4-5-4-5 [32], 8 rows of 4 [32], and 4-3-4-3-4-3-4-3-4-3 [35].

Press any key after each square is filled to continue with the next arrangement. Jim calculated the vertical and horizontal spacing between the centers of the circles by hand and put the data in line 30. SG in line 50 is the amount that every other row of circles is staggered for each of the honeycomb arrangements.

Jim suggested that if the square were 0.1 inch larger, the results would be different and a square packing would not be optimal. Care to try that one?

Wallace Leeker (Lemay, MO) pointed out that 36 one half inch diameter circles cover the same portion of the square as a single circle with a diameter of three inches, the width of the square. Is this a coincidence or is there some generality here?

Jim Speers constructed an analog computer to solve this problem. You can construct one too. Ready? Take a sheet of graph paper and get 36 pennies. Got the idea? With this analog computer you can quickly convince yourself that none of the honeycomb solutions are better than the 6 by 6 square arrangement.

Problem #51-4: Cryptic Product challenged you to solve this multiplication problem: ABC * DE = FGHIJ with each letter representing a different digit from 0 through 9. Also, C equals 2.

The answer is 402 * 39 = 15678. This solution from Justin Smalley (Boulder, CO) takes the brute force approach:

```
·1 REM ====================================
·2 REM   COMMODARES PROBLEM #51-4 :
·3 REM      CRYPTIC PRODUCT
·4 REM   SOLUTION BY
·5 REM      JUSTIN SMALLEY
·6 REM ====================================
```

```
10 A=0:C=2
15 :
20 A=A+1:IFA=CTHEN20
21 B=-1:IFA>9THENEND
30 B=B+1:IFB=AORB=CTHEN30
31 D=0:IFB>9THEN20
40 D=D+1:IFD=AORD=BORD=CTHEN40
41 E=-1:IFD>9THEN30
50 E=E+1:IFE=AORE=BORE=CORE=DTHEN50
51 IFE>9THEN40
55 :
60 P=(A*10+B)*10+C:Q=D*10+E:R=P*Q
61 R$=STR$(R):IFLEN(R$)<6THEN50
65 :
70 FORN=1TO5:Y=VAL(MID$(R$,N+1,1))
71 IFY=AORY=BORY=CORY=DORY=ETHEN50
73 FORM=1TON-1:IFM<>NTHENIFY=F(M)THEN50
74 NEXT:F(N)=Y:NEXT
75 :
80 PRINTP;"*";Q;"=";R:END
85 :
100 REM --- TO FIND ALL SOLUTIONS,
110 REM ***CHANGE THESE LINES:
120 REM 20 A=A+1
130 REM 30 B=B+1: IF B=A THEN 30
140 REM 31 C=-1: IF B>9 THEN 20
150 REM 41 E=-1: IF D>9 THEN 36
160 REM 80 PRINT P;"*";Q;"=";R: GOTO 50
170 REM ***ADD THESE LINES:
180 REM 36 C=C+1: IF C=A OR C=B THEN 36
190 REM 37 D=0: IF C>9 THEN 30
```

You may modify this program according to the instructions starting in line 100 in order to find all solutions besides those with C=2. From this modified program, Justin concluded that there are no solutions with C equal to 0, 1, 3, 8, or 9.

Rather than use this "sequential brute force" method, George Boomers (Agnos, AR) took a "random brute force" approach, also known as a Monte Carlo method. George's program randomly picked values for A, B, D, and E (with C always 2) and calculated their product. The digits of the product were checked for duplication. If there is a duplicate, the program picks the another random set of digits for A through E.

As George points out, this approach may find the solution with the first pick or it may not find it at all. George compiled this program with Abacus Software's *BASIC 128 Compiler* and found the solution in about 20 minutes. Interestingly, when he ran the program in interpreted BASIC before compiling it, it found the same answer in only 10 minutes. Evidently the random number generators used different sequences of numbers. The BASIC interpreter was just "luckier" for this particular problem.

Jim Speers deduced that C cannot equal 0 since J would then equal C. Also, C cannot be 1 since J would equal E. Jim's program constructed strings to represent ABC and DE. Duplicate digits abort the appropriate loops. The impressive thing about Jim's program is its efficiency. On the C-128 in FAST mode it finds the answer in 9 seconds or less.

```
1 REM ===================================
2 REM   COMMODARES PROBLEM #51-4 :
3 REM     CRYPTIC PRODUCT
4 REM   SOLUTION BY
5 REM     JIM SPEERS
6 REM ===================================
100 TB=TI: FAST
110 FOR I=1 TO 9: READ N$(I): NEXT: DATA
 1,3,4,5,6,7,8,9,0
120 C$="2": FOR I=1 TO 9: FOR J=1 TO 9:
IF J=I THEN 280
130 A$=N$(I)+N$(J)+C$
140 FOR K=1 TO 9: IF K=I OR K=J THEN 280
150 FOR L=1 TO 9: IF L=I OR L=J OR L=K T
HEN 260
160 B$=N$(K)+N$(L): T$=MID$(STR$(VAL(A$)
*VAL(B$)),2,10)
170 REM PRINT A$"*"B$"="T$
180 IF LEN(T$)<5 THEN 260
190 FOR Y=1 TO 4:FOR Z=Y+1 TO 5: IF MID$
(T$,Y,1)=MID$(T$,Z,1) THEN 260
200 NEXT Z,Y
210 FOR Z=1 TO 5: X$=MID$(T$,Z,1)
220 IF X$=N$(I) OR X$=N$(J) OR X$=N$(K)
OR X$=N$(L) OR X$=C$ THEN 260
230 NEXT Z
240 PRINT"THE ANSWER IS "A$"*"B$"="T$
250 TE=TI: PRINT "[DOWN]TIME IS";INT((TE
-TB)/60+.5);"SECONDS": SLOW: END
260 NEXT L
270 NEXT K
280 NEXT J
290 NEXT I
```

Removing the SLOW:END statements in line 250 allows the program to continue checking for other solutions although there are none. The entire program takes about 90 seconds. Delete the REM in line 170 to see all intermediate expressions as they are tested.

Hopefully you will get some new programming ideas by studying and modifying the programs presented here. Have a good time solving this month's problems. Keep those solutions and challenges coming. □

The following readers not already mentioned also sent valid solutions and deserve the honor of having their names listed in genuine print:

Stanley Anderson (Tishomingo, OK)
Carlos Centeno (Lares, PR)
Robert Clark (Ocean Springs, MS)
Lucien Gravelle (Cornwall, ONT)
David Kapsos (Portsmouth, NH)
Larry Louks (Freeport, TX)
Larry Miranda (Toronto, ONT)
Don Wilkins (Burke, VA)

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).

WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE	WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE
[CLEAR]	Screen Clear	SHIFT CLR/HOME		[BLACK]	Black	CNTRL 1	
[HOME]	Home	CLR/HOME		[WHITE]	White	CNTRL 2	
[UP]	Cursor Up	SHIFT ↑ CRSR ↓		[RED]	Red	CNTRL 3	
[DOWN]	Cursor Down	↑ CRSR ↓		[CYAN]	Cyan	CNTRL 4	
[LEFT]	Cursor Left	SHIFT ← CRSR →		[PURPLE]	Purple	CNTRL 5	
[RIGHT]	Cursor Right	← CRSR →		[GREEN]	Green	CNTRL 6	
[SS]	Shifted Space	SHIFT Space		[BLUE]	Blue	CNTRL 7	
[INSERT]	Insert	SHIFT INST/DEL		[YELLOW]	Yellow	CNTRL 8	
[DEL]	Delete	INST/DEL		[F1]	Function 1	F1	
[RVSON]	Reverse On	CNTRL 9		[F2]	Function 2	SHIFT F1	
[RVSOFF]	Reverse Off	CNTRL 0		[F3]	Function 3	F3	
[UPARROW]	Up Arrow	↑	↑	[F4]	Function 4	SHIFT F3	
[BACKARROW]	Back Arrow	←	←	[F5]	Function 5	F5	
[PI]	PI	π	π	[F6]	Function 6	SHIFT F5	
[EP]	English Pound	£	£	[F7]	Function 7	F7	
				[F8]	Function 8	SHIFT F7	

BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent.* You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

Type NEW and begin entering an *Ahoy!* program. As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

C-64 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
·50 X=0:J=J+12:IFJ<49456THEN20
·60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
·100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,131:POKE771,164:SYS49152:END
·170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
·180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
·190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
·200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
·210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
·220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
·230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
·240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
·250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
·260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
·270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
·280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
·290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
·300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
·310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
·320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
·330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
·340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
·350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
·360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
·370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
·380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
·390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
·400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
·410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
·420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

C-128 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
·50 X=0:J=J+12:IFJ<5213THEN20
·60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
·100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,198:POKE771,77:SYS4864:END
·170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
·180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
·190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
·200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
·210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
·220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
·230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
·240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
·250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
·260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
·270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
·280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
·290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
·300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
·310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
·320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
·330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
·340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
·350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
·360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
·370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
·380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
·390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
·400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
·410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
·420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
·430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
·440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
·450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
·460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                              OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";    FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
 ]"                                                          JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"        FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
 [3" "]"                                                     AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                         ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
 KE54296,15                                                  NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                       FL
·140 DATA169,251,166,253,164,254,32,216,255,96              FF
·145 DATA169,0,166,251,164,252,32,213,255,96                EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B        KP
·155 GOSUB480:IFB=0THEN150                                  OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16              AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B               PE
·170 GOSUB470:IFB=0THEN150                                  PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                  GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                 HG
·185 POKE253,B:PRINT                                        EC
·190 REM  GET HEX LINE                                      ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8               KD
·200 FORB=0TO1:GOTO250                                      IH
·205 NEXTB                                                  IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                  FA
·215 PRINT" [c P][LEFT]";                                   EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                  II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                 GL
·230 NEXT                                                   GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                         FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195          IM
·245 REM    GET HEX INPUT                                   PA
·250 GETA$:IFA$=""THEN250                                   GA
·255 IFA$=CHR$(20)THEN305                                   GO
·260 IFA$=CHR$(133)THEN535                                  LM
·265 IFA$=CHR$(134)THEN560                                  IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                     HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                     HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295           MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295           DJ
·290 GOSUB415:GOTO250                                       JA
·295 PRINTA$"[c P][LEFT]";                                  PK
·300 GOTO205                                                FA
·305 IFA>0THEN320                                           BI
·310 A=-1:IFB=1THEN330                                      BB
·315 GOTO220                                                FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                 BF
·325 A=A-1                                                  FK
·330 PRINTCHR$(20);:GOTO220                                 PH
·335 REM LAST LINE                                          CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                        KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255               OD
·350 NEXT                                                   OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                         LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                        BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                 MB
·370 REM BELL AND ERROR MESSAGES                            LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415    JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415        PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
 5                                                           IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
 GOTO415                                                     HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415         DM
·400 PRINT"?ERROR IN SAVE":GOTO415                          JK
·405 PRINT"?ERROR IN LOAD":GOTO415                          IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                JO
·415 POKE54276,17:POKE54276,16:RETURN                       BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN       DH
·425 REM GET FOUR DIGIT HEX                                 IM
·430 PRINT:PRINTB$;:INPUTT$                                 OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                       JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
 380:GOTO430                                                 AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN    KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN            GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN            NJ
·460 T(A)=16:RETURN                                         IC
·465 REM ADDRESS CHECK                                      OL
·470 IFAD>ENTHEN385                                         HO
·475 IFB<SRORB>ENTHEN390                                    LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395           OB
·485 RETURN                                                 HE
·490 REM ADDRESS TO HEX                                     PM
·495 AC=AD:A=4096:GOSUB520                                  AP
·500 A=256:GOSUB520                                         NF
·505 A=16:GOSUB520                                          LG
·510 A=1:GOSUB520                                           HE
·515 RETURN                                                 JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530             OC
·525 A$=CHR$(T+48)                                          JI
·530 PRINTA$;:AC=AC-A*T:RETURN                              AA
·535 A$="**SAVE**":GOSUB585                                 IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                             AB
·545 IFST=0THENEND                                          FB
·550 GOSUB400:IFT=8THENGOSUB420                             PM
·555 GOTO535                                                FI
·560 A$="**LOAD**":GOSUB585                                 PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                             PO
·570 IFST=64THEN195                                         OI
·575 GOSUB405:IFT=8THENGOSUB420                             CO
·580 GOTO560                                                GN
·585 PRINT" ":PRINTTAB(14)A$                                KA
·590 PRINT:A$="":INPUT"FILENAME";A$                         IO
·595 IFA$=""THEN590                                         HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                       HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN           NP
·610 IFB$<>"T"THEN605                                       KO
·615 RETURN                                                 PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B               DD
·625 GOSUB475:IFB=0THEN620                                  NK
·630 PRINT:GOTO195                                          HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B               FK
·640 GOSUB475:IFB=0THEN635                                  LN
·645 PRINT:GOTO670                                          HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
 OSUB410:GOTO195                                             LM
·655 PRINT" ";:NEXTB                                        LE
·660 PRINT:AD=AD+8                                          CD
·665 GETB$:IFB$=CHR$(136)THEN195                            JD
·670 GOSUB495:PRINT": ";:GOTO650                            KE
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 65 and 66 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

LIGHTNING SPEED COMPILER

FROM PAGE 44

MINI-COMP

```
•1 REM================================= IH
•2 REM                                   JD
•3 REM           MINI-COMP               BN
•4 REM  A MINIMAL COMPILER FOR THE C-64  IN
•5 REM                                   JC
•6 REM         RUPERT REPORT #57         ON
•7 REM                                   JE
•8 REM====== RUN 2000 TO COMPILE ======= HH
•10 Z=0                                  EL
•20 U=1                                  EL
•30 D=-1                                 PD
•40 S=147                                MJ
•45 PRINT CHR$(S);                       GI
•50 N=34                                 KC
•60 X=128                                ON
•70 C=N                                  IG
•80 H=19                                 LH
•90 PRINT CHR$(H);                       JG
•100 T=999                               BD
•110 C=C+U                               KF
•120 IF C=X THEN 999                     JN
•130 PRINT CHR$(C);                      LN
•140 T=T+D                               OA
•150 IF T=Z THEN 90                      JO
•160 GOTO 130                            LK
•999 END                                 GK
•1000 REM --- COMMON ROUTINES ---        NM
•1100 C=PEEK(M): M=M+1: PRINT C,: IF C=32
 THEN 1100: REM IGNORE SPACES            HG
•1110 IF C=0 THEN PRINT                  EO
•1120 RETURN                             PC
•1300 VF=TRUE: IF C<65 OR C>90 THEN VF=FA
LSE: RETURN                              IK
•1310 AD=(C-65)*2 + VM                   CF
•1320 NX=AD: GOSUB 1400: A0=NL: A1=NH   :
 REM VAR LSB                             BP
•1330 NX=AD+1: GOSUB 1400: A2=NL: A3=NH :
 REM VAR MSB                             MA
•1340 RETURN                             MP
•1400 NH=INT(NX/256)                     KK
•1410 NL=NX-256*NH                       AC
•1420 RETURN                             BP
•1500 FOR KK=1 TO N                      MG
•1510 IF CM>EM THEN PRINT"OUT OF MEMORY -
 COMPILED PRGM TOO LARGE": END           ED
•1520 POKE CM,C(KK)                      FK
•1530 PRINT CM;":";C(KK)                 EC
•1540 CM=CM+1: NEXT                      HN
•1550 RETURN                             KC
•2000 REM ====== INITIALIZATION ========= PB
•2010 DIM LL(50,2)       :REM LL(N,1)=LINE
 # OF NTH LINE                            ON
•2015 :REM  LL(N,2)=COMPILED MEM LOCATION
 OF THIS LINE                             DC
•2020 DIM C(50)    :REM STORES OBJECT CODE
 BYTES                                    BI
•2030 FALSE=0: TRUE=NOT FALSE             IG
•2040 DEF FNPTR(M)=PEEK(M)+256*PEEK(M+1)  EH
•2050 VM=49152  :REM $C000 START OF VARIA
BLE MEM                                   AG
•2060 PM=49408  :REM $C100 START OF OBJEC
T MEMORY                                  LM
•2070 EM=53247  :REM $CFFF END OF OBJECT
MEMORY                                    BK
•2080 BT=2049    :REM $0800 START OF BASIC
 TEXT                                     MC
•2085 GOSUB 11000    :REM PUT PRINT RTN IN
 MEM                                      DI
•2090 M=BT          :REM NEXT SOURCE MEMORY
 TO PEEK                                  BA
•2100 SN=1        :REM CURRENT SOURCE STATE
MENT NUMBER                               DB
•2110 CM=PM         :REM NEXT OBJECT MEMORY
 TO POKE                                  NL
•2120 FOR N=VM TO VM+51: POKE N,0: NEXT :
 REM CLR VAR'S                            EM
•2125 REM ============= MAIN ============ MI
•2130 PTR=FNPTR(M): M=M+2    :REM NEXT LIN
E PTR                                     LJ
•2140 LN=FNPTR(M): M=M+2      :REM CURRENT
 LINE #                                   IC
•2150 IF LN>999 THEN PRINT "[3"="] END OF
 PASS 1 [3"="]": GOTO 2400                BE
•2160 PRINT "[5" "]CURRENT LINE # ="; LN  HC
•2170 LL(SN,1)=LN      :REM CURRENT LINE # EG
•2180 LL(SN,2)=CM            :REM START OBJ
 MEM LOC                                  GC
•2190 SN=SN+1     :REM # SOURCE STATEMENTS AG
•2200 REM --- GET BYTE ---                FP
•2210 GOSUB 1100     :REM FETCH NEXT BYTE EO
•2220 GOSUB 1300: IF VF THEN GOSUB 3000 :
 GOTO 2290: REM 'VARIABLE                 BE
•2230 IF C=139 THEN GOSUB 4000: GOTO 2290
 : REM 'IF                                PL
•2240 IF C=137 THEN GOSUB 5000: GOTO 2290
 : REM 'GOTO                              LN
•2250 IF C=153 THEN GOSUB 6000: GOTO 2290
 : REM 'PRINT                             BE
•2260 IF C=128 THEN GOSUB 7000: GOTO 2290
 : REM 'END                               BA
•2270 IF C=143 THEN GOSUB 8000: GOTO 2290
 : REM 'REM                               AB
•2280 PRINT "UNKNOWN COMMAND CODE";C;"IN
 LINE";LL(SN,1):STOP                      IP
```

```
·2290 IF C>0 THEN EC=0: GOSUB 10000: STOP
 :REM 'EOL                                    CH
·2300 GOTO 2130  :REM BACK FOR MORE           OJ
·2400 REM  - PASS 2 - FIX JUMP ADDRESSES      DN
·2410 IF JI=0 THEN 2570 :REM NO JUMPS         OO
·2420 FOR N=1 TO JI   :REM CHECK ITEMS IN
 JUMP TABLE                                   PG
·2430 :MM=JT(N,1) :REM REFERENCED LINE #      AD
·2440 :FOR J=1 TO SN     :REM CHECK ACTUAL
 LINE #S                                      AA
·2445 :REM   - GET OBJ MEM TARGET ADDRESS
 AND JMP ADDRESS:                             NE
·2450 :IF MM=LL(J,1) THEN TADDR=JT(N,2):
 JADDR=LL(J,2): GOTO 2490                     JH
·2460 :NEXT J                                 KG
·2470 :REM NO MATCH FOUND                     OI
·2480 :EC=1: LN=JT(N,0): GOSUB 10000:STOP     HB
·2490 :NX=JADDR :REM ADDR OF LINE # MM        CB
·2530 :GOSUB 1400 :REM CONVERT LINE #         KB
·2540 :POKE TADDR,NL       :REM USE ADDR IN
 JUMP TABLE                                   EP
·2550 :POKE TADDR+1,NH                        NL
·2560 NEXT N    :REM NEXT JUMP TABLE ITEM     JJ
·2570 PRINT"[3"="] END OF PASS 2 [3"="]"      ON
·2580 PRINT"TO EXECUTE THE COMPILED PROGR
AM, ENTER"                                    HP
·2590 PRINT" SYS"; PM                         AA
·2600 END                                     LC
·3000 REM <<<  A=(-)NN, A=B, A=B+C >>>        GL
·3010 D0=A0: D1=A1 :REM ADDR OF A'S LSB       GE
·3020 D2=A2: D3=A3 :REM A'S MSB               HA
·3030 GOSUB 1100: IF C<>178 THEN EC=178:
 EC$=" = ": GOSUB 10000: STOP   :REM '=       AA
·3040 GOSUB 1100    :REM '-, NN, OR B         DJ
·3050 GOSUB 1300: IF VF THEN 3400 :REM 'B     EL
·3055 REM <<< A=(-)NN >>>                     LP
·3060 IF C=171 THEN C$="-" :REM '-            HM
·3065 IF C<>171 THEN C$=" "+CHR$(C) :REM
 '0-9                                         DI
·3070 GOSUB 1100  :REM GET DIGITS OF NN       FN
·3080 IF C=0 THEN 3120                        DB
·3085 IF CHR$(C)<"0" OR CHR$(C)>"9" THEN
 EC=48: GOSUB 10000: STOP                     LM
·3090 C$=C$+CHR$(C)                           LJ
·3100 GOTO 3070                               HP
·3120 NN=VAL(C$)                              OO
·3130 NN%=NN    :REM ERROR CHECK              BO
·3140 IF NN<0 THEN NN=NN+65536          :REM
 CONVERT (-32768,32767) TO (0,65535)          HG
·3150 NX=NN: GOSUB 1400                       NH
·3170 MSB=NH: LSB=NL                          AB
·3175 :REM LDA #NN(LSB), STA A(LSB), LDA
 #NN(MSB), STA A(MSB)                         EG
·3180 N=10: C(1)=169: C(2)=LSB: C(3)=141:
 C(4)=D0: C(5)=D1                             NP
·3190 C(6)=169: C(7)=MSB: C(8)=141: C(9)=
D2: C(10)=D3                                  CN
·3200 GOSUB 1500     :REM POKE VALUES INTO
 OBJECT MEMORY                                HF
·3210 RETURN                                  CE
·3400 REM <<< A=B OR A=B+C >>>                BN
·3410 S0=A0: S1=A1    :REM B'S LSB ADDR       PN
·3420 S2=A2: S3=A3    :REM B'S MSB            AL
·3430 GOSUB 1100                              LO
·3440 IF C=0 THEN 3600     :REM A=B           DM
·3450 REM <<< A=B+C >>>                       KF
·3460 IF C<>170 THEN EC=170:  EC$=" + ":
 GOSUB 10000: STOP :REM TEST '+               HG
·3470 GOSUB 1100: GOSUB 1300: IF NOT VF T
HEN EC=65: GOSUB 10000: STOP: REM 'C          DK
·3480 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP :REM 'EOL                        ME
·3490 S4=A0: S5=A1    :REM ADDR C'S LSB       OI
·3500 S6=A2: S7=A3    :REM C'S MSB            NE
·3530 REM CLC, LDA B(LSB), ADC C(LSB),STA
 A(LSB)                                       DJ
·3535 REM LDA B(MSB), ADC C(MSB), STA A(M
SB)                                           MP
·3540 N=19: C(1)=24: C(2)=173: C(3)=S0: C
(4)=S1                                        LD
·3550 C(5)=109: C(6)=S4: C(7)=S5: C(8)=14
1: C(9)=D0: C(10)=D1                          HD
·3560 C(11)=173: C(12)=S2: C(13)=S3: C(14
)=109: C(15)=S6: C(16)=S7                     PK
·3570 C(17)=141: C(18)=D2: C(19)=D3           DI
·3580 GOSUB 1500                              GA
·3590 RETURN                                  KC
·3600 REM <<< A=B >>>                         MJ
·3610 REM LDA B(LSB), STA A(LSB), LDA B(M
SB), STA A(MSB)                               MG
·3620 N=12: C(1)=173: C(2)=S0: C(3)=S1: C
(4)=141: C(5)=D0: C(6)=D1                     IB
·3630 C(7)=173: C(8)=S2: C(9)=S3: C(10)=1
41: C(11)=D2: C(12)=D3                        GC
·3640 GOSUB 1500                              JJ
·3650 RETURN                                  NO
·4000 REM <<<  IF A=B THEN MM  >>>            KG
·4010 GOSUB 1100  :REM 'A                     EL
·4020 GOSUB 1300: IF NOT VF THEN EC=65:
 GOSUB 10000: STOP                            KP
·4030 S0=A0: S1=A1: S2=A2: S3=A3              OK
·4040 GOSUB 1100: IF C<>178 THEN EC=178:
 GOSUB 10000: STOP   :REM '=                  IK
·4050 GOSUB 1100       :REM 'B                FC
·4060 GOSUB 1300: IF NOT VF THEN EC=65:
 GOSUB 10000: STOP                            JH
·4070 GOSUB 1100       :REM 'THEN             FE
·4080 IF C<>167 THEN EC=167: GOSUB 10000:
 STOP                                         GL
·4090 C$=""                                   GE
·4100 GOSUB 1100: IF C=0 THEN 4120   :REM
 GET MM                                       EI
·4110 C$=C$+CHR$(C): GOTO 4100                BA
·4120 MM=VAL(C$)                              OI
·4130 IF MM<0 OR MM>999 THEN EC=1:  GOSUB
 10000: STOP                                  HK
```

```
•4140 JI=JI+1         :REM JUMP TABLE INDEX OL
•4150 JT(JI,0)=LN     :REM CURRENT LINE #  ML
•4160 JT(JI,1)=MM     :REM TARGET LINE #   EB
•4170 JT(JI,2)=CM+17    :REM MEM LOC AFTER
 'JMP                                      FB
•4180 REM  LDA A(MSB), CMP B(MSB), BNE EX
IT,                                        OC
•4185 REM  LDA A(LSB), CMP B(LSB), BNE EX
IT, JMP MM                                 KA
•4190 N=19: C(1)=173: C(2)=S2: C(3)=S3     GK
•4200 C(4)=205: C(5)=A2: C(6)=A3           JG
•4210 C(7)=208: C(8)=11: C(9)=173: C(10)=
S0: C(11)=S1                               CE
•4220 C(12)=205: C(13)=A0: C(14)=A1        GB
•4230 C(15)=208: C(16)=3: C(17)=76: C(18)
=0: C(19)=0                                OA
•4240 GOSUB 1500                           PD
•4250 RETURN                               DI
•5000 REM <<< GOTO MM >>>                  GB
•5010 C$=""                                AA
•5020 GOSUB 1100: REM GET DIGITS OF MM     IB
•5030 IF C=0 THEN 5060                     MP
•5040 C$=C$+CHR$(C)                        HG
•5050 GOTO 5020                            BJ
•5060 MM=VAL(C$)                           IN
•5070 IF MM<0 OR MM>999 THEN EC=1:  GOSUB
 10000: STOP                               NJ
•5080 JI=JI+1        :REM JUMP TABLE INDEX  IA
•5085 JT(JI,0)=LN  :REM SOURCE LINE#       CG
•5090 JT(JI,1)=MM  :REM TARGET LINE#       MM
•5100 JT(JI,2)=CM+1 :REM OBJ MEM LOCATION
 AFTER 'JMP'                               NC
•5110 REM  JMP MM                          BP
•5120 N=3: C(1)=76: C(2)=0: C(3)=0         FO
•5130 GOSUB 1500                           HB
•5140 RETURN                               LG
•6000 REM <<< PRINT, PRINT A[;], OR PRINT
 CHR$(A)[;] >>>                            NH
•6010 GOSUB 1100: IF C=199 THEN 6300 :REM
 'CHR$                                     NL
•6020 IF C=0 THEN PC=13: GOSUB 6200: RETU
RN:  REM 'PRINT                            KP
•6030 GOSUB 1300: IF NOT VF THEN EC=65:
 GOSUB 10000: STOP                         EB
•6040 REM <<< PRINT A >>>                  HK
•6050 REM   LDY $A(LSB), LDX $A(MSB), JSR
 $C0E0                                     NA
•6060 PRINT: N=9: C(1)=174: C(2)=A0: C(3)
=A1                                        AK
•6070 C(4)=172: C(5)=A2: C(6)=A3           BA
•6080 C(7)=32: C(8)=224: C(9)=192          DE
•6090 GOSUB 1500                           DI
•6095 PC=32: GOSUB 6200     :REM ADD SPACE
 AFTER  DIGITS                             KK
•6100 GOSUB 1100: IF C=0 THEN PC=13: GOSU
B 6200: RETURN    :REM PRINT CR            PO
•6110 IF C<>59 THEN EC=59: GOSUB 10000:
 STOP  :REM  ' ;                           KL
•6120 GOSUB 1100: IF C>0 THEN EC=0: GOSUB
 10000: STOP                               EN
•6130 RETURN                               JH
•6200 REM --- PRINT CHARACTER PC ---       HF
•6210 REM LDA #PC, JSR $FFD2               JI
•6220 PRINT:N=5: C(1)=169: C(2)=PC: C(3)=
32                                         PG
•6230 C(4)=210: C(5)=255: GOSUB 1500       DG
•6240 RETURN                               AG
•6300 REM <<< PRINT CHR$(A) [;] >>>        MA
•6310 GOSUB 1100: IF C<>40 THEN EC=40: GO
SUB 10000: STOP :REM   '(                  HP
•6320 GOSUB 1100: GOSUB 1300: IF NOT VF T
HEN EC=65: GOSUB 10000: STOP               BE
•6330 REM    LDA A(LSB), JSR $FFD2         OL
•6340 PRINT: N=6: C(1)=173: C(2)=A0: C(3)
=A1                                        HD
•6350 C(4)=32: C(5)=210: C(6)=255          NP
•6360 GOSUB 1500                           ED
•6370 GOSUB 1100: IF C<>41 THEN EC=41: GO
SUB 10000: STOP  : REM ')                  NO
•6380 GOSUB 1100: IF C>0 THEN 6400         JO
•6390 PRINT: PC=13: GOSUB 6200: RETURN     NG
•6400 IF C<>59 THEN EC=59: GOSUB 10000:
 STOP  :REM ';                             HP
•6410 GOSUB 1100: IF C<>0 THEN EC=0:GOSUB
 10000: STOP                               PP
•6420 RETURN                               LL
•7000 REM <<< END >>>                      EL
•7005 REM    RTS                           AJ
•7010 N=1: C(1)=96: GOSUB 1500             IH
•7020 GOSUB 1100: IF C<>0 THEN EC=0:GOSUB
 10000: STOP                               DD
•7030 RETURN                               BP
•8000 REM <<< REM >>>                      DE
•8010 GOSUB 1100: IF C>0 THEN 8010         PA
•8020 RETURN                               AB
•10000 PRINT:PRINT"[RVSON]SYNTAX ERROR IN
 LINE[RVSOFF]";LN                          MC
•10010 IF EC=0 THEN PRINT"EXPECTED END-OF
-LINE NOT FOUND":RETURN                    AN
•10020 IF EC=1 THEN PRINT"INVALID LINE NU
MBER":RETURN                               AJ
•10030 IF EC=48 THEN PRINT"NUMERIC VALUE
0-9 EXPECTED": RETURN                      DO
•10040 IF EC=65 THEN PRINT"VARIABLE A-Z E
XPECTED": RETURN                           PD
•10050 IF EC>127 THEN PRINT"EXPECTED BASI
C KEYWORD ";EC$: RETURN                    NI
•10060 PRINT"EXPECTED CHARACTER[3" "]";CH
R$(EC);"[3" "]WITH ASCII VALUE"EC :RETUR
N                                          MA
•11000 REM -- PUT M.L. PRINT ROUTINE INTO
 MEMORY --                                 CB
•11010 M=49376  :REM $C0E0                 OM
•11020 CS=3319 :REM CHECKSUM               FB
•11030 READ B: IF B<0 THEN 11060           HD
•11040 POKE M,B: M=M+1: CK=CK+B            OM
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 65 and 66 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
•11050 GOTO 11030                              NB
•11060 IF CK<>CS THEN PRINT"ERROR IN DATA
 STATEMENTS STARTING AT [3"1"]20":STOP         JK
•11070 RETURN                                  PH
•11080 DATA 169, 32, 200, 136, 16, 2           PD
•11090 DATA 169, 45, 32, 210, 255, 152, 1
6, 12                                          LC
•11100 DATA 138, 73, 255, 24, 105, 1, 170
, 152                                          LM
•11110 DATA 73, 255, 105, 0, 32, 205, 189
, 96                                           MI
•11120 DATA -1                                 IB
```

THE V'LURIAN MINES

FROM PAGE 56

```
•1 GOTO55                                      PJ
•2 X=RSPPOS(1,.):Y=RSPPOS(1,1):IFX=325THE
NR=R+1:PX=PX+1:GOSUB49:MOVSPR1,15,Y:GOTO
6                                              OE
•3 IFX=12THENR=R-1:PX=PX-1:GOSUB49:MOVSPR
1,322,Y:GOTO6                                  DF
•4 IFY=40THENBEGIN:IFR=.THEN18:ELSER=R-MX
:PY=PY-1:GOSUB49:MOVSPR1,X,230:GOTO6:BEN
D                                              JA
•5 IFY=232THENR=R+MX:PY=PY+1:GOSUB49:MOVS
PR1,X,42                                       GI
•6 POKEPS,1                                    KJ
•7 GOSUB47:Z1=BUMP(1):Z1=BUMP(2)               JO
•8 IFPEEK(PS)=.THEN2:ELSEIFJOY(2)=5THEN83     BH
•9 C=RSPRITE(1,1):Z1=BUMP(1):Z2=BUMP(2):I
FZ2AND1THEN39:ELSEIF(Z1AND1)ANDC=13THEN4
0                                              EE
•10 CT=CT+1:IFCT=FCORC=7THENCT=.:F=F-1:IF
F<=.THEN28                                     EH
•11 IFBSANDTI>TMTHEN30                         NA
•12 GETA$:IFA$="B"THENGOSUB14:ELSEIFA$="
"THENGOSUB16                                   AO
•13 GOSUB47:GOTO8                              AM
•14 IFBS=.THENBS=1:BR=R:GOSUB53:PLAY"V2T8
O3WC":TI$="[6"0"]":TM=2000+LV*120:POKE48
88,30                                          HL
•15 RETURN                                     JN
•16 IFF>10THENPOKEPS,.:SPRITE1,1,7:SOUND2
,1500,60,2,1000,180,3:FORI=4TO7:POKE2040
+I-1,193:SPRITEI,,,,,,1:NEXT:SLEEP1:FORI
=4TO7:SPRITEI,.:NEXT:F=F-10:R(R,4)=.           ON
•17 RETURN                                     JP
•18 POKEPS,.:POKETS,.:TT=INT(TM/60-TI/60)
:FORI=1TO8:SPRITEI,.:NEXT:IFBSTHENGOSUB3
7                                              PL
•19 SCNCLR:SLEEP1:CHAR,3,2,"[GREEN]MISSIO
N COMPLETED [s *][s *] MINE LEVEL ":PRIN
TUSING"##";LV:SLEEP2                           LM
•20 IFCR=NCTHENCHAR,5,10,"[BLUE]REMAINING
 FUEL BONUS = ":FORI=1TOF:CHAR,30,10,"":
PRINTUSING"[c 7][3"#"]";I*5:SOUND2,4000+
I*25,1,,,,1:FORJ=1TO25:NEXT:NEXT:SC=SC+F
*5:SLEEP1                                      LO
•21 IFBSTHENCHAR,5,12,"[PURPLE]REMAINING
TIME BONUS = ":FORI=1TOTT:CHAR,30,12,"":
PRINTUSING"[RED][3"#"]";I*5:SOUND2,5000+
I*25,1,,,,.:FORJ=1TO10:NEXT:NEXT:SC=SC+T
T*5:SLEEP1                                     PJ
•22 IFBSTHENIFBR=BX+BY*MXTHENCHAR,5,15,"[
GREEN]TOTAL DEVESTATION OF MINE = [c 6]1
[3"0"]":SOUND2,3500,120,1,3000,75,.:SC=S
C+1000:GOTO25                                  FC
•23 IFBSTHENCHAR,3,16,"[c 1]BOMB MISPLACE
D [s *][s *] MINE LEFT INTACT":CHAR,12,1
7,"[c 4]500 PTS DEDUCTED":SOUND2,4000,12
0,1,.,25,3:SC=SC-500:GOTO25                    JB
•24 CHAR,2,15,"[YELLOW]BOMB NOT SET [s *]
[s *] MINE LEFT OPERATIONAL":CHAR,12,17,
"[c 1]1[3"0"] PTS DEDUCTED":SOUND2,4000,
120,1,.,25,.:SC=SC-1000                        HF
•25 SLEEP2:IFSC<.THENSC=.:ELSEIFSC>HSTHEN
HS=SC                                          JE
•26 CHAR,14,20,"[BLUE]SCORE: ":PRINTUSING
"[6"#"]";SC:CHAR,14,22,"[c 7]HIGH : ":PR
INTUSING"[6"#"]";HS                            BI
•27 CHAR,3,24,"[WHITE]PRESS [RVSON] TRIGG
ER [RVSOFF] TO ENTER NEXT MINE":DO:LOOPU
NTILJOY(2)>127:SCNCLR:LV=LV+(1ANDLV<10):
GOTO76                                         OO
•28 CHAR,7,11,"[RED][s *]  [YELLOW]FUEL S
UPPLY  DEPLETED  [RED][s *]":GOTO31           MN
•29 CHAR,7,11,"[RED][s *][4" "][YELLOW]AN
ITEON DESTROYED[4" "][RED][s *]":GOTO31       HJ
•30 CHAR,7,11,"[RED][s *] [YELLOW]BOMB SE
LF-DESTRUCT INIT [RED][s *]"                   MH
•31 CHAR,7,10,"[RED][27"[s *]"]":CHAR,7,1
2,"[s *]  [c 1][s *][s *] MISSION FAILUR
E [s *][s *]  [RED][s *]":CHAR,7,13,"[27
"[s *]"]"                                      BD
•32 POKEPS,.:POKETS,.:FORI=1TO8:SPRITEI,.
:NEXT                                          IP
•33 IFF<=.THENFORI=5000TO3000STEP-500:SOU
ND2,I,25,1,500,400,.:NEXT                      IJ
•34 IFBSTHENGOSUB37                            OP
•35 IFSC>HSTHENHS=SC                           BJ
•36 SLEEP6:GOTO64                              IF
•37 VOL15:FORI=1TO60:POKE14336+FNR(8),FNR
(256):SOUND2,300+FNR(300),2,,,,3:NEXT          EI
•38 VOL5:FORI=1TO30:POKE14336+FNR(8),.:FO
RJ=1TO10:NEXT:SOUND2,300+FNR(100),2,,,,3
:NEXT:VOL15:RETURN                             KP
•39 X=RSPPOS(1,.):IF(X>115ANDX<225)ANDRSP
POS(1,1)>221THEN8:ELSE44                       PE
•40 IFZ1AND2THENBEGIN:R(R,7)=.:SPRITE2,.:
CR=CR+1:PLAY"V2O3T0IC"                         GD
```

```
•41 BEND:SC=SC+50*LV:GOTO7                      HD
•42 IFZ1AND4THENBEGIN:R(R,6)=.:SPRITE3,.:
F=F+FNR(12)+LV:PLAY"V2T3O3WC":IFF>99THEN
F=99                                            NC
•43 BEND:SC=SC+25:GOTO7                         HB
•44 POKEPS,.:X=RSPPOS(1,.):Y=RSPPOS(1,1):
FORI=4TO7:POKE2039+I,193:SPRITEI,.,8,1,.
,.,1:MOVSPRI,.#.:MOVSPRI,X,Y:SPRITEI,1:N
EXT                                             DE
•45 SOUND2,5000,155,.,100,600,3:FORI=1TO4
0:MOVSPRFNR(3)+4,X+FNR(16)-8,Y+FNR(20)-1
0:NEXT:FORI=1TO8:SPRITEI,.:NEXT                 DB
•46 GOTO29                                      CJ
•47 CHAR,.,24,"[c 5]SC:[c 4]":PRINTUSING"
[6"#"]";SC;:PRINTUSING"  [c 5]X:[c 4]##"
;PX;:PRINTUSING" [c 5]Y:[c 4]##";PY;            BG
•48 PRINTUSING" [c 5]TIME[c 4]:[LEFT].##,
##";VAL(TI$)/1E4;:PRINTUSING" [c 5]FUEL:
[c 4]##";F;:RETURN                              NN
•49 SYSBO:POKESH,R(R,9):FAST:FORI=2TO8:SP
RITEI,.:NEXT:POKEN1,R(R,.):POKES1,R(R,1)
:POKEE1,R(R,2):POKEW1,R(R,3):POKEC1,R(R,
8):SYS8278                                      AD
•50 IFR(R,4)>.THENFORI=1TOR(R,4):SPRITE3+
I,1,3,.,.,.,.,.:MOVSPR3+I,.,.:MOVSPR3+I,FN
R(360)#FNR(3)+3+LV/3.5:NEXT                     IF
•51 IFR(R,7)THENSPRITE2,1,6,.,.,.,.,1:MOVSP
R2,150,130                                      PB
•52 IFR(R,6)THENSPRITE3,1,3,.,.,.,.,.:MOVSP
R3,180,150                                      HE
•53 POKE2041,195:POKE2042,194:SPRITE1,1:I
FBSANDBR=RTHENCHAR,18,11,"[c 6][s Z][GRE
EN][s Z][c 6][s Z][LEFT][LEFT][UP][s Z][
LEFT][DOWN][DOWN][s Z]"                         BA
•54 SLOW:RETURN                                 CJ
•55 SCNCLR:COLOR.,1:COLOR4,1:FAST:GRAPHIC
1:GRAPHIC.:DIMR(99,9),A$(1,21),M$(12)           LG
•56 RESTORE142:FORI=8192TO9818:READA$:POK
EI,DEC(A$):NEXT                                 MN
•57 RESTORE121:FORI=1TO21:READA$(.,I):NEX
T:FORI=1TO16:READA$(1,I):NEXT                   FK
•58 B$="[RVSON][38" "][RVSOFF]":D(.)=2:D(
1)=-80:D(2)=-2:D(3)=80:Z=RND(-TI):DEFFNR
(Z)=INT(RND(1)*Z):PUDEF "0.:"                   KK
•59 D$=CHR$(27)+"W":FORI=1TO8:KEYI,CHR$(1
32+I):NEXT                                      JL
•60 PS=4878:CS=4875:N1=4864:S1=4865:W1=48
66:E1=4867:C1=4868:SH=4869:LV=1:SD=54272
:TS=4890:BO=9657                                HB
•61 V2$="V2O2W":V3$="V3O3Q":FORI=2TO12:RE
ADA$:M$(I)=V2$+A$:READA$:M$(I)=M$(I)+V3$
+A$+"M":NEXT:ENVELOPE3,9,.,.,.,9,1              GL
•62 M$(.)="V2X0T7O2WCV3X0O3T9ICDECDECDEV2
O1AWR":M$(1)="V2O2WGV3O2IABO3CO2ABO3CO2A
BO3CV2O2AWR"                                    LP
•63 SYS8192:POKEPS,.:POKETS,.:SYS8466:SPR
COLOR3,7                                        MN
•64 SYSBO:SCNCLR:FAST:WINDOW.,.,39,24:PRI
NTCHR$(27)"M"                                   PL
•65 CHAR,.,.,"[RED][s K]"+B$+"[c 3][s L]"
:FORI=1TO23:CHAR,.,I,"[RED][RVSON] ":CHA
R,39,I,"[c 3] ":NEXT:CHAR,.,24,"[RVSOFF]
[s I]"+B$+"[s J]":WINDOW1,1,38,23:PRINTC
HR$(27)"L":SLOW                                 IM
•66 PRINTD$D$D$;:FORI=1TO21:CHAR,.,.,A$(.
,22-I):PRINTD$:NEXT                             EE
•67 TEMPO16:ENVELOPE7,9,9,12,12,FNR(2)+1,
RND(1)*4000+50:ENVELOPE9,2,9,7,8,FNR(2)+
1,RND(1)*4000+50                                PI
•68 FORI=.TO12:GETA$:IFA$<>""THEN69:ELSEP
LAYM$(I):NEXT                                   OF
•69 FORI=1TO16:CHAR,9,22,A$(1,I):PRINT:NE
XT:CHAR,10,22,"[BLUE]LAST SCORE: ":PRINT
USING"[6"#"]";SC:PRINT:CHAR,10,22,"[c 7]
HIGH SCORE: "                                   OM
•70 PRINTUSING"[6"#"]";HS:PRINT:CHAR,10,2
2,"[CYAN]MINE LEVEL:[5" "]":PRINTUSING"#
#";LV:PRINT:PRINT:PRINT:PRINT                   JP
•71 FORI=1TO200:GETJ$:IFJ$=CHR$(133)THEN7
5:ELSEIFJ$=CHR$(139)THENWINDOW.,.,39,24,
1:SYS8491:END                                   OE
•72 IFJ$<>CHR$(135)ANDJ$<>CHR$(136)THENNE
XT:GOTO66                                       KG
•73 IFJ$=CHR$(136)THENLV=LV-(1ANDLV>1):EL
SELV=LV+(1ANDLV<10)                             FJ
•74 CHAR,26,17,"":PRINTUSING"##";LV:GOTO7
1                                               EF
•75 SC=.:WINDOW.,.,39,24                        LM
•76 SYSBO:MX=INT(3+LV/2.2):MY=INT(3+LV/2)
:NC=INT(LV+FNR(3)):FAST:GOSUB104:BX=INT(
MX/2):BY=INT(MY/2):PX=.:PY=.:BS=.               OG
•77 SCNCLR:SLOW:CHAR,9,10,"[BLUE]ENTERING
 MINE LEVEL ":PRINTUSING"##";LV                 BC
•78 FILTER500,1,.,.,.,15:PLAY"V1X1V2X1V3X1"
:CHAR,10,14,"":PRINTUSING"[c 7]RETRIEVE
## CRYSTALS";NC:SOUND3,2000,240,.,1000,2
5,.:SLEEP4                                      EI
•79 POKE4873,1:POKE4886,10-(LV/2)+4:POKE4
885,1:POKE4880,4:POKE4879,1:POKE2040,202
:F=45+LV*5:CR=.:R=.:FC=18:GOSUB49               JP
•80 SPRITE1,1,13,1,.,.,.,.:MOVSPR1,160,130      FJ
•81 POKESD+6,105:POKESD+5,.:POKESD,90:POK
ESD+1,5:POKESD+15,3:POKESD+14,.:POKESD+1
9,8:POKESD+20,.                                 PC
•82 POKEPS,1:POKETS,1:POKE4888,100:POKECS
,INT(6-LV/2):TI$="[6"0"]":GOTO6                 LO
•83 IFR(R,4)>.THENSOUND2,1100,5:GOTO9:ELS
ESYSBO:S=.:POKEPS,.:FAST:FORI=1TO8:SPRIT
EI,.:NEXT:SCNCLR:COLOR5,12:FORI=.TOMY*2:
PRINTLEFT$(B$,MX*2+2):NEXT                      MJ
•84 FORI=.TOMX-1:FORJ=.TOMY-1:B=I+J*MX:X1
=I*2+1:Y1=J*2+1:IFS=.THEN87                     KO
•85 IFR(B,7)THENBEGIN:CHAR,X1,Y1,"[GREEN]
1",1:IFR(B,6)THENCHAR,X1,Y1,"[BLUE]3",1:
BEND:ELSEIFR(B,6)THENCHAR,X1,Y1,"[RED]2"
,1                                              ON
```

```
•86 GOTO92                                       EL
•87 IFR(B,.)=.THENCHAR,X1,Y1-1,"[s -]",1         FD
•88 IFR(B,1)=.THENCHAR,X1,Y1+1,"[s -]",1         GC
•89 IFR(B,2)=.THENCHAR,X1+1,Y1,"[s *]",1         IP
•90 IFR(B,3)=.THENCHAR,X1-1,Y1,"[s *]",1         KI
•91 CHAR,X1,Y1," "                               CN
•92 NEXT:NEXT:CHAR,BX*2+1,BY*2+1,"[PURPLE
]X",1                                            PG
•93 CHAR,.,19,"[BLUE][40"[s *]"]":PRINT"[
c 7][RVSON] TRIGGER[3" "][RVSOFF] - SCA
N MINE":PRINT"[CYAN][RVSON] STICK DOWN [
RVSOFF] - RETURN[RED]"                           HN
•94 CHAR,25,.,"[c 1][s *][s *] CRYSTALS [
s *][s *]":CHAR,25,2,"[RED]RETRIEVED:"+S
TR$(CR):CHAR,25,3,"LEFT[5" "]:"+STR$(NC-
CR)                                              PK
•95 CHAR,25,7,"[PURPLE][s *][s *] MAP VIE
W [s *][s *]":CHAR,25,9,"[GREEN]1 - CRYS
TAL":CHAR,25,10,"2 - FUEL":CHAR,25,11,"3
 - BOTH 1 & 2":CHAR,25,12,"X - BOMB POS"
:CHAR,25,13,"[s Q] - ANITEON"                    BB
•96 CHAR,25,20,"[RED]PLANT BOMB AT":CHAR,
25,21,"":PRINTUSING"X:##";BX;:PRINTUSING
" Y:##";BY                                       HI
•97 IFBSTHENCHAR,25,16,"[GREEN]DETONATE A
T:":CHAR,25,17,STR$(INT(TM/60))+" SEC"           GA
•98 SLOW:DO:GOSUB47:IFJOY(2)=5THENSCNCLR:
GOSUB49:GOTO6                                    JF
•99 CHAR,PX*2+1,PY*2+1,"[WHITE][s Q]":CT=
CT+1:IFCT>FC*2THENCT=.:F=F-1:IFF<=.THEN2
8                                                AI
•100 IFBSANDTI>TMTHEN30                          FP
•101 IFJOY(2)<128THENLOOP                        EE
•102 IFF-5<1THENSOUND1,2000,10:LOOP              JH
•103 F=F-5:S=1:GOTO84                            DE
•104 PRINT"[CLEAR][RED]";:A=1065:FORI=.TO
MY*2:PRINTLEFT$(B$,MX*2+2):NEXT:POKEA,3:
POKE1025,32                                      CC
•105 J=FNR(4):K=J                                FB
•106 B=A+D(J):IFPEEK(B)=160THENPOKEB,J:PO
KEA+D(J)/2,32:A=B:GOTO105                        DC
•107 J=(J+1)*-(J<3):IFJ<>KTHEN106                OI
•108 J=PEEK(A):POKEA,32:IFA=1065THEN109:E
LSEA=A-D(J):GOTO105                              MD
•109 POKE1066,32:FORI=1TOFNR(MX*MY):X=FNR
(MX):Y=FNR(MY-1):POKE1105+X*2+Y*80,32:NE
XT                                               AF
•110 FORY=.TOMY-1:FORX=.TOMX-1:A=1065+X*2
+Y*80:B=X+Y*MX:FORZ=.TO9:R(B,Z)=.:NEXT           DH
•111 IFPEEK(A-40)<>32THENR(B,.)=1                AH
•112 IFPEEK(A+40)<>32THENR(B,1)=1                AO
•113 IFPEEK(A+1)<>32THENR(B,2)=1                 JE
•114 IFPEEK(A-1)<>32THENR(B,3)=1                 MF
•115 IFB>.THENR(B,4)=FNR(5)                      EG
•116 IFRND(1)>.85THENR(B,6)=1                    ID
•117 R(B,8)=FNR(9)+3:R(B,9)=FNR(7)*8             DH
•118 NEXT:NEXT:FORI=1TONC                        OB
•119 Z=FNR(MX*MY):IFR(Z,7)=1THEN119:ELSER
(Z,7)=1                                          OB
•120 NEXT:RETURN                                 LP
•121 DATA "[12" "][c 1]AHOY! PRESENTS",,         OC
•122 DATA "[15" "][YELLOW]T  H  E",              EJ
•123 DATA "[5" "][GREEN][s G][RVSON][c M]
[c G][RVSOFF][s E][WHITE][s J][GREEN][s
L]  [s K][RVSON][c M][c G][RVSOFF][s L]
[s K][RVSON]  [RVSOFF][s L] [s K][s L] [
s B][s D]  [s K][RVSON]  [RVSOFF][s L]"          GK
•124 DATA "[5" "][GREEN][s H][RVSON][c M]
[c G][RVSOFF][s F][s B][RVSON] [RVSOFF]
 [RVSON] [c M][c G] [RVSOFF] [RVSON] [RV
SOFF][c J][RVSON][c J][RVSOFF][s J] [RVS
ON]  [RVSOFF] [s A][s C]  [RVSON] [c M][
c G] "                                           LK
•125 DATA "[6" "][GREEN][s G][s E] [s A][
RVSON] [RVSOFF]  [RVSON] [c M][c G] [RVS
OFF] [RVSON][3" "][RVSOFF][s L] [RVSON]
[RVSOFF][s E][s B][RVSON][c M][c G][RVSO
FF][s D] [RVSON] [c M][c G] "                    HM
•126 DATA "[6" "][c 6][s H][s F] [s I][RV
SON]  [RVSOFF][s D][s G][RVSON]  [RVSOFF
][s J] [RVSON] [c M][c G] [RVSOFF] [s I]
[s F][s A][RVSON][c M][c G][RVSOFF][s C]
 [RVSON] [c M][c G] ",                           MM
•127 DATA "[4" "][BLUE][s B][RVSON][c *][
RVSOFF]  [RVSON][sEP][RVSOFF][s D] [s K]
[RVSON]  [RVSOFF][s L] [s K][RVSON][4" "
][RVSOFF][s L] [s K][RVSON][5" "][RVSOFF
] [s K][RVSON][4" "][RVSOFF][s L]"               HC
•128 DATA "[4" "][BLUE][s A][RVSON] [c *]
[sEP] [RVSOFF][s C] [RVSON][4" "][RVSOFF
] [RVSON][6" "][RVSOFF] [RVSON][3" "][3"
[c P]"][RVSOFF] [RVSON][3" "][3"[c P]"][
c 3]"                                            AE
•129 DATA "[3" "][BLUE][s B][RVSON][6" "]
[RVSOFF][s D][s G][RVSON][3" "][RVSOFF]
[RVSON]  [c L][c J]  [RVSOFF] [RVSON][3"
 "][3"[c Y]"][RVSOFF] [RVSON][3" "][3"[c
 Y]"]"                                           GD
•130 DATA "[3" "][BLUE][s A][RVSON]  [c L
][c J]  [RVSOFF][s C][s H][RVSON][3" "][
RVSOFF] [RVSON]  [c L][c J]  [RVSOFF] [R
VSON][3" "][3"[c P]"][RVSOFF] [RVSON][3"
[c P]"][3" "]"                                   EE
•131 DATA "  [BLUE][s B][RVSON][3" "][c L
][c J][3" "][RVSOFF][s D][s G][RVSON]  [
RVSOFF] [RVSON]  [c L][c J]  [RVSOFF] [R
VSON][3" "][3"[c Y]"][RVSOFF] [RVSON][3"
[c Y]"][3" "]"                                   JM
•132 DATA "  [c 7][s A][RVSON][3" "][c L]
[c J][3" "][RVSOFF][s C][s H][RVSON] [RV
SOFF][s J] [RVSON]  [c L][c J]  [RVSOFF]
[s I][RVSON][5" "][RVSOFF] [s I][RVSON]
[4" "][RVSOFF][s J][CNTRL P]                     LB
•133 DATA "  [CYAN][10"[s *]"] [s *][s *]
 [6"[s *]"] [6"[s *]"] [6"[s *]"]"               EM
•134 DATA "  [CYAN][10"[c T]"] [c T][c T]
```

```
[6"[c T]"] [6"[c T]"] [6"[c T]"]"                 KP
•135 DATA "","[9" "][PURPLE]WRITTEN BY M
IKE HOYT"                                         PC
•136 DATA "",,,,,,                                EN
•137 DATA "[GREEN][RVSON] F1 [RVSOFF] BEG
IN MISSION",                                      HO
•138 DATA "[c 6][RVSON] F3 [RVSOFF] SELEC
T MINE LEVEL",                                    IO
•139 DATA "[WHITE][RVSON] F7 [RVSOFF] RES
IGN COMMAND",                                     LP
•140 DATA "",,                                    LJ
•141 DATA C,CCCCM,D,DDDD,F,FFFF,C,CCCC,E,
EFEF,A,ABAB,G,GAGA,E,EGEG,C,CDCD,#C,#CE#
CE,01.WE,02EFGF.HE                                IO
•142 DATA A9,1,8D,,FF,A9,,85,FB,A9,D0,85,
FC,A9,,85,FD,A9,38,85,FE,A2,8,A0,,B1,FB,
91,FD,C8,D0,F9,A5,FC,69                           DB
•143 DATA 1,85,FC,A5,FE,69,1,85,FE,CA,D0,
E8,A9,,8D,,FF,A9,1E,8D,2C,A,A9,4,85,D9,A
2,5F,BD,C2,25,9D,8,3A,CA                          GP
•144 DATA 10,F7,A2,37,BD,22,26,9D,C8,3B,C
A,10,F7,4C,7F,22,A9,4,85,FC,A9,,8D,9,13,
85,FB,85,FD,A9,D8,85,FE,A2,18                     KG
•145 DATA A0,26,A9,,91,FB,AD,4,13,91,FD,8
8,10,F4,CA,F0,1C,18,A5,FB,69,28,85,FB,A5
,FC,69,,85,FC,A5,FD,69,28,85                      KN
•146 DATA FD,A5,FE,69,,85,FE,4C,69,20,A2,
,AC,5,13,B9,C8,3B,9D,,38,C8,E8,E0,8,D0,F
4,AD,,13,D0,B,A9,C,85                             JC
•147 DATA FC,A9,4,85,FD,20,F3,20,AD,1,13,
D0,B,A9,3C,85,FC,A9,6,85,FD,20,F3,20,AD,
2,13,D0,B,A9,18,85,FC,A9,5                        LI
•148 DATA 85,FD,20,F3,20,AD,3,13,D0,B,A9,
30,85,FC,A9,5,85,FD,20,F3,20,A9,24,85,FC
,A9,5,85,FD,20,F3,20,60,A2,A                      BP
•149 DATA A0,E,A9,20,91,FC,88,10,F9,CA,F0
,10,18,A5,FC,69,28,85,FC,A5,FD,69,,85,FD
,4C,F5,20,60,AD,14,3,8D,7,13                      LE
•150 DATA AD,15,3,8D,8,13,78,A9,3A,8D,14,
3,A9,21,8D,15,3,58,60,78,AD,7,13,8D,14,3
,AD,8,13,8D,15,3,58,60,20                         EF
•151 DATA 9F,21,AD,1A,13,F0,3,20,CE,22,AD
,E,13,D0,7,A9,80,8D,4,D4,D0,4B,20,C6,21,
AD,,DC,29,10,D0,7,A9,6,8D                         NM
•152 DATA 27,D0,D0,3A,A9,C,8D,27,D0,20,F2
,21,20,32,23,C0,,10,2B,20,39,22,AD,E6,11
,6A,B0,9,AD,D6,11,C9,D,B0,B                       NL
•153 DATA 90,14,AD,D6,11,C9,45,90,2,B0,B,
AD,D7,11,C9,29,90,4,C9,E8,90,5,A9,,8D,E,
13,6C,7,13,EE,9,13,AD,9                           GP
•154 DATA 13,CD,B,13,D0,47,A9,,8D,9,13,AC
,,38,8C,A,13,A2,,BD,1,38,9D,,38,E8,E0,7,
D0,F5,8C,7,38,60,EE                               LA
•155 DATA 15,13,AD,15,13,CD,16,13,D0,20,A
9,,8D,15,13,EE,17,13,AE,17,13,A9,C4,E0,2
,D0,7,A9,C5,A2,,8E,17,13,A2                       HI
•156 DATA 3,9D,FB,7,CA,10,FA,60,CE,F,13,A
D,F,13,F0,1,60,A9,6,8D,F,13,20,32,23,E0,
,F0,27,10,10,CE,10,13,AD                          FL
•157 DATA 10,13,10,17,A9,7,8D,10,13,4C,28
,22,EE,10,13,AD,10,13,C9,8,D0,5,A9,,8D,1
0,13,18,69,C6,8D,F8,7,AD,D                        OJ
•158 DATA 13,30,5,A9,80,8D,4,D4,60,A9,81,
8D,4,D4,AE,10,13,BD,55,22,A8,BD,4D,22,AA
,20,E8,22,60,,1,1,1,,FF                           JB
•159 DATA FF,FF,FF,FF,,1,1,1,,FF,A9,30,85
,FD,A9,,85,FC,A2,F,A0,40,A9,,91,FC,88,10
,FB,A5,FC,69,40,85,FC                             JN
•160 DATA A5,FD,69,,85,FD,CA,10,E8,A9,51,
85,FB,A9,23,85,FC,A9,40,85,FD,A9,30,85,F
E,A2,D,A0,,B1,FB,C9,5,F0,5                        JK
•161 DATA 91,FD,C8,D0,F5,A9,,C8,8C,14,13,
88,88,C8,91,FD,C0,40,D0,F9,CA,F0,1D,18,A
5,FB,6D,14,13,85,FB,A5,FC,69,                     PA
•162 DATA 85,FC,A5,FD,69,40,85,FD,A5,FE,6
9,,85,FE,4C,91,22,60,CE,19,13,AD,19,13,F
0,1,60,AD,18,13,8D,19,13,A9,20                    IG
•163 DATA 8D,12,D4,A9,21,8D,12,D4,60,8E,1
2,13,8C,13,13,C0,,D0,5,E0,,D0,F,60,C0,,1
0,5,CE,D7,11,D0,F2,EE,D7                          LL
•164 DATA 11,D0,ED,AC,12,13,C0,,10,13,AD,
D6,11,C9,,D0,8,AD,E6,11,29,FE,8D,E6,11,C
E,D6,11,60,AD,D6,11,C9,FF,D0                      EF
•165 DATA 8,AD,E6,11,9,1,8D,E6,11,EE,D6,1
1,60,A2,,A0,,AD,,DC,4A,B0,1,88,4A,B0,1,C
8,4A,B0,1,CA,4A,B0,1                              HP
•166 DATA E8,4A,8E,C,13,8C,D,13,60,,A4,,4
,2,80,1,14,14,20,46,4,45,45,50,46,14,50,
55,55,50,22,11,28,15,95                           DL
•167 DATA 48,85,41,52,50,46,19,89,52,58,5
6,11,41,45,95,90,4A,45,94,14,50,40,9,55,
50,4,48,60,,51,5,33,,,6D                          HK
•168 DATA 80,,DE,C0,,3F,,,3F,,,DE,C0,,6D,
80,,33,5,3,,,D,C0,,36,70,,DA,9C,,36,70,,
D                                                 FL
•169 DATA C0,,3,5,,,,,,,33,E6,,1C,1C,,1E,
3C,,37,F6,,33,E6,,33,E6,,33,E6,,37,F6,,1
E                                                 KH
•170 DATA 3C,,1C,1C,,33,E6,5,,80,,,80,,3,
E0,,C,98,,18,8C,,31,C6,,33,E6,,FF,FF,80,
33,E6,                                            CK
•171 DATA 31,C6,,18,8C,,C,98,,3,E0,,,80,,
,80,5,,20,,,20,,,70,,,70,,,F8,,,F8                MA
•172 DATA ,1,FC,,1,8C,,3,6,,7,FF,,F,FF,80
,1F,FF,C0,1F,77,C0,1F,77,C0,3,76,5,,,,,
,                                                 BE
•173 DATA ,,,,C0,,3,C0,,3F,C0,F,FF,80,F,C
7,80,1F,E3,80,F,F3,,E,7B,,4,FF,,1,DE,,1,
9E,                                               JF
•174 DATA ,3E,,,7E,,,2E,,,E,5,,,,,,,,,,1,
C0,,1,E0,,1,F0,,3,F8,,3,FE                        MG
•175 DATA ,,77,80,3,F3,E0,3,F1,F8,3,F3,E0
,,77,80,3,FE,,3,F8,,1,F0,,1,E0,,1,C0,5,,
,,                                                KD
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·176 DATA ,,,,,,E,,,2E,,,7E,,,3E,,1,9E,,1
,DE,,4,FF,,E,7B,,F,F3,,1F,E3,80          NH
·177 DATA F,C7,80,F,FF,80,,3F,C0,,3,C0,,,
C0,5,,,,,,,,,,,,,,,,,,,3                 DG
·178 DATA 76,,1F,77,C0,1F,77,C0,1F,FF,C0,
F,FF,80,7,FF,,3,6,,1,8C,,1,FC,,,F8,,,F8,
,,70,                                    KF
·179 DATA ,70,,,20,,,20,5,,,,,,,,,,3,80,,
3,A0,,3,F0,,3,E0,,3,CC,,3,DC             GK
·180 DATA ,7,F9,,6,F3,80,6,7F,80,E,3F,C0,
F,1F,80,F,FF,80,1F,E0,,1E,,18,5,,,,,,,,, KC
·181 DATA ,,1C,,,3C,,,7C,,,FE,,3,FE,,F,70
,,3E,7E,,FC,7E,,3E,7E,,F,70,,3,FE,,      KF
·182 DATA FE,,,7C,,,3C,,,1C,5,,,,,,,,,,18
,,,1E,,,1F,E0,,F,FF,80,F,1F,80           NF
·183 DATA E,3F,C0,6,7F,80,6,F3,80,7,F9,,3
,DC,,3,CC,,3,E0,,3,F0,,3,A0,,3,80,5,AD,1
1,D0,29,EF                               IE
·184 DATA 8D,11,D0,60,1F,1F,3F,3F,7F,7F,F
F,FF,1,1,3,3,7,7,F,F,F8,F8,FC,FC,FE,FE,F
F,FF,80,80,C0,C0,E0,E0,F0                JF
·185 DATA F0,FF,FF,FE,FE,FC,FC,F8,F8,F0,F
0,E0,E0,C0,C0,80,80,FF,FF,7F,7F,3F,3F,1F
,1F,F,F,7,7,3,3,1,1,FF,FF                DA
·186 DATA FF,7F,7F,3F,1F,7,FF,FF,FF,FE,FE
,FC,F8,E0,7,1F,3F,7F,7F,FF,FF,FF,E0,F8,F
C,FE,FE,FF,FF,FF,FF,3,3,3,FF             EB
·187 DATA 3,3,3,F0,F6,F6,F0,F,6F,6F,F,,7E
,7E,7E,7E,7E,7E,,18,18,,C3,C3,,18,18,66,
60,66,66,66,6,66,66                      II
·188 DATA C3,66,3C,18,3C,66,C3,81,18,18,F
F,99,99,FF,18,18,9E                      JE
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TURBO SKI
FROM PAGE 34

Starting address in hex: C000
Ending address in hex: CBEE
SYS to start: 49152

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C000: 20 52 C7 20 1D C5 20 7D DA
C008: C6 AD E6 CB F0 03 4C A4 14
C010: C0 AD E1 CB F0 03 20 7B BB
C018: C4 20 83 C0 20 17 C1 20 5A
C020: E8 C4 20 8E C1 20 6B C0 8A
C028: 20 A5 C2 20 FC C2 20 EB 9C
C030: C1 AD DE CB F0 06 20 36 97
C038: C2 4C 09 C0 EE DC CB AD 56
C040: DC CB C9 11 D0 C3 A9 00 02
C048: 8D DC CB EE DE CB 20 19 51
C050: C7 EE E0 CB AD E0 CB C9 D7
C058: 10 D0 AE A9 07 8D 29 D0 20
C060: 8D 2A D0 A9 00 8D E0 CB CC
C068: 4C 09 C0 EE D7 CB AD D7 96
C070: CB D0 F8 EE D8 CB AD D8 20
C078: CB C9 10 D0 EE A9 00 8D 15
C080: D8 CB 60 A2 00 AD E5 CB 87
C088: F0 10 8E E5 CB A0 F8 98 FB
C090: 9D FD 07 C8 E8 E0 03 D0 99
C098: F6 60 A0 FB A9 01 8D E5 AA
C0A0: CB 4C 8F C0 A2 00 BD 33 9C
C0A8: C8 9D EF 05 BD 3D C8 9D 65
C0B0: 17 06 A9 07 9D EF D9 9D 83
C0B8: 17 DA E8 E0 0A D0 E7 A9 E0
C0C0: F1 8D 15 D0 20 6B C0 20 92
C0C8: 83 C0 20 8E C1 20 EB C1 4B
C0D0: AD 00 DC C9 7D D0 ED A9 0B
C0D8: 00 8D E2 CB 8D E3 CB 8D DF
C0E0: E4 CB 8D DE CB 8D DF CB 03
C0E8: 8D E6 CB 8D DC CB 8D E0 CD
C0F0: CB 8D DB CB A9 01 8D DD 08
C0F8: CB 8D 52 C2 A9 11 8D 43 F2
C100: C0 A9 10 8D 7A C0 A9 0A F6
C108: 8D 99 C3 8D 02 C5 A2 00 EA
C110: 20 5F C6 4C 06 C0 60 AD 77
C118: 00 DC C9 7F F0 F8 8D ED A3
C120: CB AD ED CB 29 08 D0 28 7D
C128: AD 10 D0 29 01 F0 07 AD 86
C130: 00 D0 C9 20 F0 E0 A2 00 5F
C138: EE 00 D0 E8 E0 04 D0 F8 8F
C140: AD 00 D0 D0 08 AD 10 D0 26
C148: 09 01 8D 10 D0 4C 7E C1 4D
C150: AD ED CB 29 04 D0 27 AD 8A
C158: 10 D0 29 01 D0 07 AD 00 E8
C160: D0 C9 24 F0 19 A2 00 CE 9A
C168: 00 D0 E8 E0 04 D0 F8 AD 7E
C170: 00 D0 C9 FC D0 08 AD 10 9E
C178: D0 29 FE 8D 10 D0 AD ED 7B
C180: CB 29 10 D0 08 AD E1 CB B9
C188: D0 03 20 39 C4 60 A9 31 B5
C190: 8D B0 C1 A9 18 8D AF C1 51
C198: A9 00 8D D9 CB A9 00 8D AC
C1A0: DA CB AE DA CB BD 7A CB A0
C1A8: A8 A2 00 B9 D2 CA 9D 18 01
C1B0: 31 C8 E8 E0 08 D0 F4 18 5A
C1B8: AD DA CB 69 08 8D DA CB B2
C1C0: 18 AD AF C1 69 08 8D AF A6
C1C8: C1 B0 03 4C D1 C1 EE B0 BD
C1D0: C1 EE D9 CB AD D9 CB C9 44
C1D8: 0A D0 C7 EE 9E C1 AD 9E 17
C1E0: C1 C9 08 D0 05 A9 00 8D 81
C1E8: 9E C1 60 AD DF CB D0 FA CE
C1F0: AD 08 D0 6D DD CB 8D 08 24
C1F8: D0 B0 03 4C 06 C2 AD 10 50
C200: D0 09 10 8D 10 D0 EE FC 44
C208: 07 AD FC 07 C9 F2 D0 05 53
C210: A9 F0 8D FC 07 AD 10 D0 CA
C218: 29 10 F0 19 AD 08 D0 C9 AB
C220: 50 90 12 AD 10 D0 29 EF BA
C228: 8D 10 D0 A9 00 8D 08 D0 A6
C230: A9 F0 8D FC 07 60 A2 00 5F
C238: BD CA CB CD 05 D0 F0 3C 5D
C240: E8 E0 06 D0 F3 A2 00 EE 66
C248: 05 D0 EE 07 D0 20 85 C2 4D
C250: E8 E0 01 D0 F2 EE DB CB 75
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C258: AD DB CB C9 08 D0 08 A9 02
C260: 00 8D DB CB EE 52 C2 AD 47
C268: 05 D0 C9 CF D0 0D A9 01 60
C270: 8D 52 C2 A9 00 8D DB CB F1
C278: 8D DE CB 60 EE FA 07 EE F0
C280: FB 07 4C 45 C2 18 AD 04 A1
C288: D0 69 01 8D 04 D0 B0 03 D9
C290: 4C 9B C2 AD 10 D0 09 04 D6
C298: 8D 10 D0 38 AD 06 D0 E9 AD
C2A0: 01 8D 06 D0 60 AD 05 D0 E9
C2A8: C9 AE D0 40 A2 00 AD 1E A0
C2B0: D0 8D EC CB BD E7 CB CD 07
C2B8: EC CB F0 3E E8 E0 04 D0 3F
C2C0: F3 AD 10 D0 29 01 D0 0D 4B
C2C8: 38 AD 00 D0 ED 04 D0 8D CF
C2D0: EB CB 4C E8 C2 38 A9 FF 62
C2D8: ED 04 D0 8D EB CB 18 AD A6
C2E0: EB CB 6D 00 D0 8D EB CB 1C
C2E8: C9 5A B0 01 60 A9 11 8D 67
C2F0: 0B D4 20 95 C3 A9 10 8D 91
C2F8: 0B D4 60 60 AD 29 D0 29 6A
C300: 0F C9 07 D0 F6 AD 05 D0 2B
C308: C9 B0 90 EF A2 00 BD 47 AA
C310: C8 9D F0 05 A9 07 9D F0 AB
C318: D9 E8 E0 08 D0 F0 AD 00 33
C320: DC C9 7E D0 F9 A2 00 A9 5C
C328: 27 9D F0 05 A9 0D 9D F0 28
C330: D9 E8 E0 08 D0 F1 A9 00 48
C338: 8D 29 D0 8D 2A D0 AD E3 D9
C340: CB C9 10 D0 31 AD E4 CB 46
C348: F0 2C AD E2 CB C9 0B B0 47
C350: 1C AD 99 C3 C9 64 F0 0C A2
C358: 18 AD 99 C3 69 0A 8D 99 16
C360: C3 8D 02 C5 CE 43 C0 CE 1B
C368: 7A C0 EE DD CB 20 08 C4 29
C370: 20 1F C4 4C 79 C3 20 2A 48
C378: C4 A9 00 8D DF CB 8D E3 91
C380: CB 8D E4 CB A9 B0 8D 3B AD
C388: 04 8D 3C 04 A9 F0 8D FC 7F
C390: 07 20 6B C0 60 EE E3 CB E2
C398: A2 0A 20 B4 C3 CA D0 FA 74
C3A0: EE 3C 04 AD 3C 04 C9 BA 42
C3A8: F0 01 60 A9 B0 8D 3C 04 23
C3B0: EE 3B 04 60 EE 33 04 AD 13
C3B8: 33 04 C9 BA F0 01 60 A9 70
C3C0: B0 8D 33 04 EE 32 04 AD 09
C3C8: 32 04 C9 BA F0 01 60 A9 7F
C3D0: B0 8D 32 04 EE 31 04 AD 17
C3D8: 31 04 C9 BA F0 01 60 A9 8E
C3E0: B0 8D 31 04 EE 30 04 AD 25
C3E8: 30 04 C9 BA F0 01 60 A9 9D
C3F0: B0 8D 30 04 EE 2F 04 AD 33
C3F8: 2F 04 C9 BA F0 01 60 A9 AC
C400: B0 8D 2F 04 EE 20 D0 60 B1
C408: EE E2 CB EE 4E 04 AD 4E E2
C410: 04 C9 BA F0 01 60 A9 B0 45
C418: 8D 4E 04 EE 4D 04 60 AD 46
C420: 45 04 C9 B9 F0 03 EE 45 15
C428: 04 60 AD 45 04 C9 B0 D0 CE
C430: 04 EE E6 CB 60 CE 45 04 4E
C438: 60 A9 01 8D E1 CB 18 AD 44
C440: 00 D0 69 13 8D 02 D0 B0 9E
C448: 03 4C 54 C4 AD 10 D0 09 48
C450: 02 8D 10 D0 A9 A8 8D 03 A3
C458: D0 AD 15 D0 09 02 8D 15 6A
C460: D0 A9 E9 8D F9 07 AD 10 11
C468: D0 29 01 F0 08 AD 10 D0 EA
C470: 09 02 8D 10 D0 A9 81 8D A2
C478: 04 D4 60 AD 03 D0 4A 4A C7
C480: 4A 8D 01 D4 CE 03 D0 CE 9F
C488: 03 D0 A2 00 AD 03 D0 DD 5E
C490: D0 CB F0 0E E8 E0 06 D0 CC
C498: F3 AD 03 D0 DD D0 CB F0 79
C4A0: 05 60 EE F9 07 60 A9 00 FF
C4A8: 8D E1 CB AD 15 D0 29 FD 9E
C4B0: 8D 15 D0 AD 10 D0 29 FD D9
C4B8: 8D 10 D0 A9 80 8D 04 D4 B7
C4C0: 60 EE FC 07 AD FC 07 C9 8F
C4C8: F7 D0 1C A9 80 8D 04 D4 3E
C4D0: A9 00 8D DF CB A9 01 8D EB
C4D8: 08 D0 AD 10 D0 29 EF 8D E6
C4E0: 10 D0 A9 F0 8D FC 07 60 4E
C4E8: AD DF CB D0 D4 AD 1E D0 84
C4F0: C9 12 D0 F3 A9 81 8D 04 4E
C4F8: D4 8D 01 D4 A9 F2 8D FC 58
C500: 07 A2 0A 20 B4 C3 8E 01 DB
C508: D4 CA D0 F7 A9 01 8D DF 88
C510: CB EE E4 CB AD 15 D0 29 38
C518: FD 8D 15 D0 60 A2 00 8A 17
C520: 9D 00 38 9D 00 39 9D 00 6A
C528: 3A 9D 00 3B 9D 00 3C 9D B2
C530: 00 3D 9D 00 3E 9D 00 3F 26
C538: E8 E0 00 D0 E3 A2 00 BD 17
C540: 97 C8 9D C1 39 E8 E0 34 37
C548: D0 F5 A0 00 A2 00 BD 1C 2C
C550: C9 99 52 3A BD 2B C9 99 8C
C558: 8F 3A BD 3A C9 99 CC 3A 84
C560: BD 49 C9 99 09 3B BD 58 25
C568: C9 99 46 3B BD 67 C9 9D D9
C570: 07 3C BD 76 C9 9D 47 3C D2
C578: BD 85 C9 9D 87 3C C8 C8 78
C580: C8 E8 E0 0F D0 C8 A2 00 5E
C588: BD 94 C9 9D C6 3C BD A8 AB
C590: C9 9D 04 3D E8 E0 14 D0 E7
C598: EF A2 00 A0 00 BD CB C8 1E
C5A0: 99 19 38 BD D1 C8 99 56 D3
C5A8: 38 BD D7 C8 99 93 38 BD 62
C5B0: DD C8 99 0A 39 BD E3 C8 9E
C5B8: 99 1C 39 BD E9 C8 99 47 F8
C5C0: 39 99 81 39 BD EF C8 99 5E
C5C8: 59 39 99 93 39 BD 0E C9 57
C5D0: 99 D0 38 C8 C8 C8 E8 E0 97
C5D8: 06 D0 C2 A2 00 BD F5 C8 91
C5E0: 9D 6B 39 BD 14 C9 9D E2 3F
C5E8: 38 BD BC C9 9D 18 3D E8 41
C5F0: E0 08 D0 E9 A2 00 BD FD F2
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C5F8: C8 9D A2 39 E8 E0 11 D0 E6
C600: F5 A9 30 8D BC 3A 8D F9 DB
C608: 3A 8D 39 3B 8D 73 3B 8D 0E
C610: 79 3B A9 FC 8D 36 3B 8D F7
C618: 76 3B A9 20 8D 83 3B 8D 6D
C620: 86 3B 8D C0 3B A2 00 BD CB
C628: C4 C9 9D 09 3E BD F1 C9 15
C630: 9D 49 3E BD 1E CA 9D 89 23
C638: 3E BD 4B CA 9D C9 3E BD AD
C640: 78 CA 9D 09 3F BD A5 CA 97
C648: 9D 49 3F E8 E0 2D D0 D7 0E
C650: A2 00 BD 7E C8 9D 00 D4 6A
C658: E8 E0 19 D0 F5 A2 00 BD 62
C660: 4F C8 9D 00 D0 E8 E0 2F DF
C668: D0 F5 A9 E7 8D F8 07 A9 F7
C670: F0 8D FC 07 A9 E0 8D FA 06
C678: 07 8D FB 07 60 A9 99 20 D3
C680: D2 FF A9 93 20 D2 FF A9 2D
C688: 05 8D A1 C6 A9 40 8D A0 9B
C690: C6 A9 23 8D 9E C6 A9 00 C0
C698: 8D D9 CB A2 00 A9 23 9D D8
C6A0: 40 05 E8 E0 28 D0 F8 18 B9
C6A8: AD A0 C6 69 28 8D A0 C6 44
C6B0: B0 03 4C B8 C6 EE A1 C6 87
C6B8: EE 9E C6 EE D9 CB AD D9 29
C6C0: CB C9 0A D0 D6 A2 00 A9 54
C6C8: A0 9D D0 06 9D E8 06 A9 14
C6D0: 00 9D D0 DA 9D E8 DA E8 64
C6D8: E0 00 D0 EB A2 00 BD 93 6A
C6E0: C7 9D C8 04 A9 06 9D C8 29
C6E8: D8 E8 E0 78 D0 F0 A2 00 68
C6F0: BD 0B C8 9D 28 04 A9 A0 96
C6F8: 9D 00 04 9D 50 04 A9 00 36
C700: 9D 00 D8 9D 28 D8 9D 50 03
C708: D8 E8 E0 28 D0 E2 A9 80 B0
C710: 8D 0E D4 8D 0F D4 8D 12 91
C718: D4 A9 E0 8D FA 07 8D FB 90
C720: 07 A9 00 8D 29 D0 8D 2A 10
C728: D0 A9 66 8D 05 D0 8D 07 01
C730: D0 AD 1B D4 C9 78 90 F9 6B
C738: C9 FF B0 F5 8D 04 D0 8D 98
C740: 06 D0 AD 10 D0 29 04 F0 C3
C748: 08 AD 10 D0 49 04 8D 10 C9
C750: D0 60 AD 0E DC 29 FE 8D CF
C758: 0E DC A5 01 29 FB 85 01 95
C760: A2 00 BD 00 D0 9D 00 30 5F
C768: E8 E0 00 D0 F5 EE 64 C7 14
C770: EE 67 C7 AD 67 C7 C9 37 6C
C778: D0 E6 A9 30 8D 67 C7 A9 70
C780: D0 8D 64 C7 A5 01 09 04 BE
C788: 85 01 AD 0E DC 09 01 8D 3F
C790: 0E DC 60 20 20 20 20 A0 FC
C798: 20 20 20 A0 A0 20 20 20 9A
C7A0: 20 20 20 20 20 20 20 20 A1
C7A8: 20 20 20 20 20 A0 20 20 2A
C7B0: 20 20 20 A0 20 20 20 20 32
C7B8: 20 20 20 20 20 20 20 A0 3A
C7C0: A0 20 20 A0 A0 20 20 20 43
C7C8: A0 A0 A0 A0 20 20 20 20 CB
C7D0: 20 A0 20 20 20 A0 20 20 D2
C7D8: A0 A0 A0 A0 20 A0 A0 20 DC
C7E0: 20 A0 20 64 A0 64 64 A0 30
C7E8: A0 64 64 A0 A0 A0 64 64 FC
C7F0: A0 A0 A0 A0 64 A0 A0 64 7D
C7F8: 64 A0 64 64 A0 A0 64 64 D0
C800: A0 A0 A0 A0 64 A0 A0 64 8C
C808: A0 A0 64 A0 93 83 8F 92 87
C810: 85 BA B0 B0 B0 B0 B0 A0 64
C818: 87 81 94 85 93 BA B0 B0 EA
C820: A0 93 88 89 90 93 BA B0 F5
C828: B0 A0 8C 85 96 85 8C BA EE
C830: B0 B1 A0 07 01 0D 05 20 6D
C838: 20 0F 16 05 12 10 15 13 CC
C840: 08 20 20 04 0F 17 0E 10 D0
C848: 15 13 08 20 20 15 10 A4 82
C850: AC 00 00 00 66 00 66 00 C9
C858: 52 70 E5 A0 E5 D0 E5 00 3E
C860: 1B 00 00 00 FD D0 00 1D 67
C868: 00 00 00 F3 E1 00 00 00 3E
C870: 0E 02 19 00 02 00 01 07 A3
C878: 00 00 07 0A 0A 0A 00 00 9D
C880: 00 00 80 0D 09 03 24 00 3E
C888: 00 10 05 05 FF FF 00 00 A2
C890: 80 0C 09 00 00 00 8F 20 D5
C898: 00 00 88 00 02 22 00 0A 4F
C8A0: AA 80 2A 9A A0 A8 B8 A8 3B
C8A8: 00 98 00 00 B8 00 00 64 5E
C8B0: 00 00 00 00 00 30 00 00 E0
C8B8: FC 00 03 FF 00 0F FF C0 88
C8C0: 3F FF F0 FC FC FC 00 FC E4
C8C8: 00 00 30 10 10 10 00 00 29
C8D0: 00 18 18 18 18 18 00 18 61
C8D8: 3C 18 18 18 3C 1C 7F 3E 73
C8E0: 1C 1C 1C 1C 1C 1C 1C 1C C1
C8E8: 7F 3C FF 7E 3C 3C 3C 3C 14
C8F0: 3C 3C 3C 3C 3C 3C 00 00 5A
C8F8: 7E 00 01 FF 80 3C 00 00 35
C900: 3C 00 00 3C 00 00 3C 00 B4
C908: 00 7E 00 01 FF 80 1C 3E 62
C910: 1C 1C 1C 1C 1C 00 00 1C B8
C918: 00 00 3E 00 10 20 A8 A8 D7
C920: B8 B8 20 00 30 30 FC FC 0C
C928: FC FC 30 20 A8 A8 A8 B8 25
C930: 20 00 00 00 00 30 FC FC 7A
C938: FC FC 20 A8 A8 B8 20 00 7C
C940: 00 00 00 00 00 30 FC FC 6A
C948: FC 20 A8 A8 20 00 00 00 D6
C950: 00 00 00 00 00 00 30 FC 7D
C958: 20 A8 20 00 00 00 00 00 41
C960: 00 00 00 00 00 00 00 54 B4
C968: 00 05 55 40 16 66 60 55 35
C970: 55 54 01 55 00 00 54 00 C4
C978: 05 55 40 19 99 90 55 55 01
C980: 54 01 55 00 00 14 00 04 43
C988: 44 40 1D DD D0 55 11 14 53
C990: 01 45 00 00 01 11 00 04 EC
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 65 and 66 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C998: 40 40 10 44 50 44 11 04 17
C9A0: 15 44 90 04 08 40 01 55 2D
C9A8: 14 00 01 00 40 04 00 10 12
C9B0: 10 00 04 40 00 00 00 00 05
C9B8: 00 10 00 04 00 00 10 01 DD
C9C0: 00 40 00 51 55 54 00 02 FD
C9C8: 00 00 01 00 00 02 00 00 CB
C9D0: 01 00 00 02 00 00 01 00 D4
C9D8: 00 02 22 2A 01 11 11 02 4C
C9E0: 22 22 01 11 14 02 22 22 91
C9E8: 01 11 11 02 2A 22 01 00 5B
C9F0: 00 00 00 05 00 00 08 00 FD
C9F8: 00 04 00 00 08 00 00 04 09
CA00: 00 00 08 00 00 04 2A 2A 60
CA08: 0A 11 11 00 22 22 00 14 8C
CA10: 11 00 22 22 00 11 11 00 87
CA18: 2A 2A 00 00 00 05 54 00 C5
CA20: 00 00 00 00 00 00 00 00 20
CA28: 00 00 00 00 00 00 00 00 28
CA30: 00 00 00 A8 88 80 04 44 2A
CA38: 40 08 88 80 04 50 40 08 26
CA40: 88 80 04 44 40 08 88 80 E2
CA48: 54 00 00 AA A8 00 01 00 F0
CA50: 00 02 00 00 01 00 00 02 55
CA58: 00 00 01 00 00 02 00 00 5B
CA60: 01 11 15 02 22 22 01 11 DF
CA68: 11 02 22 28 01 11 11 02 EA
CA70: 22 22 01 15 11 02 00 00 DD
CA78: 00 00 0A 00 00 04 00 00 86
CA80: 08 00 00 04 00 00 08 00 94
CA88: 00 04 00 00 08 15 15 05 C3
CA90: 22 22 00 11 11 00 28 22 41
CA98: 00 11 11 00 22 22 00 15 14
CAA0: 15 00 00 00 0A A8 00 00 68
CAA8: 00 00 00 00 00 00 00 00 A8
CAB0: 00 00 00 00 00 00 00 00 B0
CAB8: 00 00 54 44 40 08 88 80 A2
CAC0: 04 44 40 08 A0 80 04 44 BA
CAC8: 40 08 88 80 04 44 40 A8 4B
CAD0: 00 00 AA AA AA AA AA AA D0
CAD8: AA AA FF AA AA AA AA AA 83
CAE0: AA AA AA FF AA AA AA AA 8B
CAE8: AA AA AA AA FF AA AA AA 93
CAF0: AA AA AA AA AA FF AA AA 9B
CAF8: AA AA AA AA AA AA FF AA A3
CB00: AA AA AA AA AA AA AA FF AA
CB08: AA AA AA AA AA AA AA AA 5D
CB10: FF AA AA AA AA AA AA AA BA
CB18: AA FF FF FF AA AA AA AA 6D
CB20: AA AA AA AA FF FF AA AA 20
CB28: AA AA AA AA AA AA FF FF 28
CB30: AA AA AA AA AA AA AA AA 85
CB38: FF FF FF FF FF AA AA AA 38
CB40: AA AA AA AA AA FF FF FF 95
CB48: AA AA AA FF FF FF AA AA 9D
CB50: AA AA AA AA AA AA FF FF 50
CB58: FF AA AA AA FF FF FF AA 03
CB60: AA AA AA AA AA AA AA FF 0B
CB68: FF FF FF FF FF FF AA AA BD
CB70: AA AA AA AA AA AA FF FF 70
CB78: FF FF 08 10 18 20 28 30 21
CB80: 38 40 48 50 58 60 00 00 4A
CB88: 00 00 00 00 00 00 48 50 21
CB90: 58 60 68 70 60 00 00 00 82
CB98: 00 00 00 00 08 78 80 40 D9
CBA0: 00 00 00 00 00 00 00 48 E8
CBA8: 88 90 98 A0 00 00 00 00 FA
CBB0: 00 00 00 00 98 A0 00 00 E9
CBB8: 00 00 00 00 00 00 98 A0 F1
CBC0: 00 00 00 00 00 00 00 00 C0
CBC8: 98 A0 6C 74 7E 8A 96 A2 25
CBD0: 9E 90 82 70 5E 5A 54 00 FF
CBD8: 00 00 00 00 00 01 00 00 D9
CBE0: 00 00 00 00 00 00 00 05 E5
CBE8: 07 09 0B 00 00 00 00 04
```

VIDEO SNAPSHOT
FROM PAGE 30

```
·10 REM *VIDEO SNAPSHOT FOR THE C-64*          NI
·20 REM BY JIM PARTIN FOR AHOY!                DI
·30 FOR T=52374 TO 53246:READ D:POKET,D:N
EXT T                                          NO
·40 SYS52374                                   MD
·50 PRINT"[7" "]*VIDEO SNAPSHOT* INSTALLE
D!"                                            DH
·60 PRINT"HIT 'RESTORE' TO ACTIVATE WHEN
NEEDED.."                                      NF
·70 NEW                                        OI
·80 DATA169,161,141,24,3,169,204,141           KE
·90 DATA25,3,96,72,138,72,152,72               AP
·100 DATA173,13,221,16,3,76,188,254            JJ
·110 DATA173,251,207,208,23,32,188,246         NM
·120 DATA32,225,255,208,18,32,21,253           EB
·130 DATA32,163,253,32,24,229,32,150           FA
·140 DATA204,108,2,160,76,34,207,169           HF
·150 DATA1,141,251,207,165,1,141,252           EO
·160 DATA207,169,55,133,1,173,32,208           FJ
·170 DATA141,253,207,173,0,221,73,255          FI
·180 DATA41,3,10,10,10,10,10,10                JG
·190 DATA141,175,207,173,24,208,74,74          AA
·200 DATA41,252,24,109,175,207,141,177         PC
·210 DATA207,173,17,208,10,10,10,176           CB
·220 DATA3,76,89,206,173,24,208,41             EI
·230 DATA8,10,10,24,109,175,207,141            FE
·240 DATA179,207,173,22,208,41,16,240          PA
·250 DATA3,76,165,205,169,0,141,32             NN
·260 DATA208,32,142,207,201,13,208,3           MK
·270 DATA76,12,207,141,189,207,173,17          GP
```

```
·280 DATA208,41,239,141,17,208,169,8       KK
·290 DATA170,168,32,186,255,169,14,162     PH
·300 DATA180,160,207,32,189,255,32,192     PF
·310 DATA255,162,8,32,201,255,169,0        OM
·320 DATA32,210,255,169,92,32,210,255      KF
·330 DATA32,130,207,144,3,76,12,207        AG
·340 DATA169,0,162,4,141,247,207,142       KH
·350 DATA248,207,173,176,207,174,177,207   MC
·360 DATA141,116,207,142,117,207,32,45     OE
·370 DATA207,144,3,76,12,207,169,0         DI
·380 DATA162,32,141,247,207,142,248,207    KH
·390 DATA173,178,207,174,179,207,141,116   ID
·400 DATA207,142,117,207,32,45,207,169     KL
·410 DATA8,32,195,255,76,12,207,169        LE
·420 DATA1,141,32,208,32,142,207,201       FN
·430 DATA13,208,3,76,12,207,141,206        GF
·440 DATA207,173,17,208,41,239,141,17      IP
·450 DATA208,169,8,170,168,32,186,255      ND
·460 DATA169,21,162,194,160,207,32,189     EJ
·470 DATA255,32,192,255,162,8,32,201       JL
·480 DATA255,169,0,32,210,255,169,96       GM
·490 DATA32,210,255,32,130,207,144,3       ON
·500 DATA76,12,207,169,64,162,31,141       AF
·510 DATA247,207,142,248,207,173,178,207   KB
·520 DATA174,179,207,141,116,207,142,117   MH
·530 DATA207,32,45,207,144,3,76,12         DD
·540 DATA207,169,232,162,3,141,247,207     FH
·550 DATA142,248,207,173,176,207,174,177   PN
·560 DATA207,141,116,207,142,117,207,32    CG
·570 DATA45,207,144,3,76,12,207,169        MJ
·580 DATA232,162,3,141,247,207,142,248     DN
·590 DATA207,169,1,141,254,207,169,0       KG
·600 DATA162,216,141,116,207,142,117,207   DE
·610 DATA32,45,207,169,0,141,254,207       CL
·620 DATA144,3,76,12,207,173,33,208        IK
·630 DATA32,210,255,169,8,32,195,255       LA
·640 DATA76,12,207,169,6,141,32,208        EG
·650 DATA32,142,207,201,13,208,3,76        MI
·660 DATA12,207,141,222,207,141,238,207    GB
·670 DATA173,17,208,41,239,141,17,208      OH
·680 DATA169,8,170,168,32,186,255,169      FG
·690 DATA16,162,215,160,207,32,189,255     FE
·700 DATA32,192,255,162,8,32,201,255       FI
·710 DATA169,0,32,210,255,169,4,32         JO
·720 DATA210,255,32,130,207,144,3,76       KI
·730 DATA12,207,169,232,162,3,141,247      GF
·740 DATA207,142,248,207,173,176,207,174   AP
·750 DATA177,207,141,116,207,142,117,207   IA
·760 DATA32,45,207,144,3,76,12,207         MD
·770 DATA169,8,32,195,255,169,8,170        FP
·780 DATA168,32,186,255,169,16,162,231     MF
·790 DATA160,207,32,189,255,32,192,255     GC
·800 DATA162,8,32,201,255,169,0,32         BM
·810 DATA210,255,169,216,32,210,255,32     CB
·820 DATA130,207,144,3,76,12,207,169       BN
·830 DATA232,162,3,141,247,207,142,248     OE
·840 DATA207,169,0,162,216,141,116,207     GE
·850 DATA142,117,207,32,45,207,169,8       LF
·860 DATA32,195,255,76,12,207,32,204       DP
·870 DATA255,173,253,207,141,32,208,173    IL
·880 DATA17,208,9,16,141,17,208,169        DF
·890 DATA0,141,251,207,104,168,104,170     HA
·900 DATA104,173,252,207,133,1,64,24       HB
·910 DATA169,1,141,249,207,169,0,141       HO
·920 DATA250,207,32,110,207,32,210,255     JO
·930 DATA32,130,207,144,1,96,238,249       FE
·940 DATA207,208,3,238,250,207,238,116     GI
·950 DATA207,208,3,238,117,207,173,249     KB
·960 DATA207,205,247,207,208,15,173,250    NF
·970 DATA207,205,248,207,208,7,32,110      DP
·980 DATA207,32,210,255,96,76,56,207       BO
·990 DATA120,162,53,134,1,173,255,255      PI
·1000 DATA172,254,207,240,2,41,15,162      AP
·1010 DATA55,134,1,96,32,183,255,10        PO
·1020 DATA144,5,169,8,32,195,255,96        NB
·1030 DATA32,204,255,32,159,255,32,228     NB
·1040 DATA255,120,240,247,201,13,240,16    HN
·1050 DATA201,48,144,239,201,91,176,235    GE
·1060 DATA201,65,176,4,201,58,176,227      NN
·1070 DATA96,0,0,0,0,0,48,58               OG
·1080 DATA68,68,83,78,65,80,32,49          HN
·1090 DATA44,80,44,87,48,58,129,80         KD
·1100 DATA73,67,32,83,78,65,80,32          CI
·1110 DATA49,32,32,32,32,44,80,44          FH
·1120 DATA87,48,58,83,78,65,80,32          KE
·1130 DATA49,46,83,67,78,44,80,44          CO
·1140 DATA87,48,58,83,78,65,80,32          EI
·1150 DATA49,46,67,76,82,44,80,44          IH
·1160 DATA87,0,0,1,0,0,55,0                BF
·1170 DATA0                                EP
```

TRAP SHOOT
FROM PAGE 34

BASIC PORTION

```
·10 IFA=0THENA=1:PRINT"[CLEAR][3"[DOWN]"]
 "SPC(11)"LEAVE DISK IN DRIVE":LOAD"TRAP.
 SPRTS",8,1                                   GG
·20 POKE53280,0:D$="[HOME]":FORT=1TO40:D$
 =D$+"[DOWN]":C$=C$+" ":NEXT:PRINT"[CLEAR
 ]"                                           CL
·30 GOSUB530:POKE53281,14:PRINT"[CLEAR][D
 OWN][DOWN][RVSOFF][WHITE]  [c @][c P][c
 O][c O][RVSON][c U][c Y][3" "][c U][RVSO
 FF][c O][c @]"SPC(30)"[c T][c T][5"[c Y]
 "][3"[c U]"][c Y]"                           LL
·40 A$="[c @][c P][c O][c I][c O][c P][c
 O][c P]":FORT=1TO5:W$=W$+A$:NEXT             IC
·50 PRINTSPC(21)"[UP][c @][c P][c P][c O]
 [c I][RVSON][c U][c T]  [c Y][3"[c U]"][
 RVSOFF][c O][c P][c @]"SPC(23)"[5"[c T]"
 ][4"[c Y]"][4"[c T]"][DOWN]"                 GB
·60 PRINTSPC(9)"[c @][c @][c P][c P][c O]
 [c O][c P][c @][c @][5" "][c @][c P][c P
 ][3"[c O]"][c P][c P][c @][c @]"             LN
```

```
•70 PRINTSPC(6)"[c 8][c @][c @][4" "][SS]
[3"[c @]"][3" "][c @][c @][c P][c @][c @
][5" "][SS][c @][c @][3" "][c @]"         NM
•80 A$=C$+C$:PRINTLEFT$(D$,11)"[c 2]"W$"[
CYAN][RVSON]"C$"[GREEN]"A$"[CYAN]"A$A$"[
GREEN]"A$A$A$;                            FE
•90 V=53248:POKEV+28,103:POKEV+37,9:POKEV
+38,7:FORT=0TO6:READW,A                   BG
•100 POKEV+T+39,W:POKE2040+T,A:NEXT:FORT=
0TO13:READW:POKEV+T,W:NEXT                OB
•110 FORT=832TO1023:POKET,0:NEXT:POKE832,
14:POKE896,28:POKE899,62:POKE960,62       MN
•120 POKE963,127:U=54272:POKEU+24,15:POKE
V+29,96                                   GF
•130 FORT=0TO4:READA$(T):NEXT             HH
•140 IFTT>29THENFORT=1TO600:NEXT:GOTO430  HA
•150 FORT=1TO400:NEXT:POKEV+4,175:POKEV+5
,140:POKEV+21,231:FORT=1TO1100:NEXT       PD
•160 B=0:A=89:Q=23:K=195:H%=RND(1)*2:Z=14
0:W%=RND(1)*150+100:AE=3+DF/2:S=0         MG
•170 H%=110+H%*145:IFH%=W%THEN160         BD
•180 GOSUB510:M=(K-Z)/(H%-W%):B=K-M*H%:Y=
K:AB=RND(.6)+.4:H=0:TT=TT+1               KN
•190 J=PEEK(56320):F=JAND16:J=JAND15:J=15
-J:A=PEEK(V+4):W=PEEK(V+5)                LM
•200 PRINT" [RVSON][YELLOW] SHELLS"TC-S"[
LEFT],[RIGHT][c 6] HIT"HT"[LEFT] OF"TT-1
"[LEFT] [RVSOFF] [RVSON] USED"TS"[LEFT]
[UP]"                                     MC
•210 C=0:D=0:IFJAND4ANDA>97THENC=-GS      FO
•220 IFJAND8ANDA<250THENC=GS              PH
•230 IFJAND1ANDW>60THEND=-GS              ND
•240 IFJAND2ANDW<185THEND=GS              EP
•250 IFF<>16ANDS<TCTHEN330                BA
•260 POKEV+4,PEEK(V+4)+C:POKEV+5,PEEK(V+5
)+D                                       PN
•270 AC=AC+1:IFAC<3THEN190                CO
•280 AC=0:Y=Y-AE:X=(Y-B)/M:W=15:IFY<167TH
ENW=14:IFY<152THENW=13:AB=-ABS(AB*1.1)    MM
•290 POKE2043,W:POKE2044,W:IFW<>14THENH=H
+AB*(3+DF/3)                              PP
•300 IFH<0THENPOKEV+21,231:GOTO140        OJ
•310 POKEV+7,Y-H:POKEV+9,Y:POKEV+6,X:POKE
V+8,X:AE=AE*.93:POKEV+21,255              OO
•320 POKEV+4,PEEK(V+4)+C:POKEV+5,PEEK(V+5
)+D:GOTO190                               JG
•330 POKEV+21,235:POKEV+1,201:S=S+1:TS=TS
+1                                        CL
•340 Q=28:A=3:W=8:GOSUB510:POKEV+1,200    BA
•350 W=ABS(PEEK(V+4)-X):A=PEEK(V+5)-Y+H:C
=15-PEEK(2043)                            FH
•360 IFW>C*2ANDW<12-C*2ANDA>-14+C*2ANDA<-
9THEN380                                  EG
•370 AC=2:POKEV+21,255:GOTO260            FL
•380 POKEV+6,X-9:POKEV+7,Y-8-H:FORT=194TO
196                                       EC
•390 POKE2043,T:FORW=1TO70:NEXTW,T:POKEV+
7,0:POKEV+21,227:HT=HT+1:POKE2043,15      IA
•400 GOTO140                              LE
•410 DATA 2,192,,193,,198,1,13,0,13,0,197
,0,197,175,200,175,221,,,,,,,92           BH
•420 DATA195,235,195,TERRIBLE,BAD,ABOUT A
VERAGE,WELL,LIKE A PRO                    PA
•430 POKE53281,2:POKEV+21,0:POKEU+24,0    CO
•440 W%=HT/TT*100:PRINT"[CLEAR][4"[DOWN]"
][YELLOW]"SPC(6)"YOU SHOT"W%"[LEFT]% OF
THE TARGETS.[DOWN][DOWN]"                 JK
•450 A%=HT/TS*100:PRINTSPC(5)"OF THE SHEL
LS FIRED,"A%"[LEFT]% HIT.[DOWN][DOWN]"    OA
•460 A$="YOU SHOOT "+A$((A%+W%)/50)+".":P
RINTSPC(20-LEN(A$)/2)A$                   DN
•470 PRINT"[5"[DOWN]"]":A$="[RVSON][8" "]
HIT ANYTHING TO CONTINUE[8" "][UP]"       MJ
•480 PRINT"[YELLOW]"A$;                   AJ
•490 GETB$:IFB$<>""THENCLR:GOTO20         CP
•500 PRINT"[c 8]"A$;:GOTO480              IN
•510 POKEU+4,0:POKEU+5,0:POKEU+4,128:POKE
U+5,Q:POKEU+1,A:POKEU,W:POKEU+4,129       GE
•520 RETURN                               JI
•530 DF=1:TC=2:POKE53281,7                EB
•540 PRINT"[HOME][DOWN][DOWN][RED]"SPC(10
)"1.  DIFFICULTY "DF                      IE
•550 PRINTSPC(10)"2. "TC"SHELLS PER TARGE
T"                                        NI
•560 PRINTSPC(10)"3.  BEGIN GAME"         ID
•570 GETA$:A=VAL(A$):IFA=1THENDF=DF+1:IFD
F=5THENDF=1                               BK
•580 IFA=2THENTC=TC+1:IFTC=5THENTC=1      BH
•590 IFA=3THENGS=3+DF/2:RETURN            CJ
•600 GOTO540                              HL
```

TRAP.SPRTS

Starting address in hex: 3000
Ending address in hex: 31C1
***Flankspeed* required for entry! See page 67.**

```
3000: 00 00 00 00 00 00 00 00 00
3008: 00 00 15 00 00 55 40 00 B2
3010: 55 40 00 55 40 03 55 40 D3
3018: 03 15 00 0F 2A F0 0E AA 13
3020: AC 0A 99 A8 0A A6 A8 0A 7C
3028: A6 A8 0A A6 A0 02 A6 A0 12
3030: 02 A6 80 02 99 80 02 AA 22
3038: 80 00 AA 00 00 AA 00 00 0E
3040: 00 AA 00 02 AA 00 02 AA 44
3048: 00 02 AA 00 02 AA 00 0A AB
3050: 8A 00 0A 8A 00 0A 0A 00 83
3058: 0A 0A 00 0A 0A 00 0A 4A D4
3060: 40 05 45 40 05 05 00 00 35
3068: 00 00 00 00 00 00 00 00 68
3070: 00 00 00 00 00 00 00 00 70
3078: 00 00 00 00 00 00 00 03 7B
3080: 00 00 00 00 00 00 00 00 80
3088: 00 00 00 00 00 00 00 00 88
3090: 00 00 00 20 00 02 00 00 B2
3098: 00 2E 00 02 FB 00 00 88 4D
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 65 and 66 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
30A0: 00 00 00 00 00 00 00 00 A0
30A8: 00 00 00 00 00 00 00 00 A8
30B0: 00 00 00 00 00 00 00 00 B0
30B8: 00 00 00 00 00 00 00 00 B8
30C0: 00 00 00 00 00 00 00 60 21
30C8: 80 00 00 10 08 21 00 00 82
30D0: 00 00 00 88 00 00 30 80 0A
30D8: 00 3E 00 01 0F 00 00 20 47
30E0: 80 00 00 00 00 00 00 00 61
30E8: 00 00 00 00 00 00 00 00 E8
30F0: 00 00 00 00 00 00 00 00 F0
30F8: 00 00 00 00 00 00 00 00 F8
3100: 00 20 20 10 00 00 02 00 52
3108: 04 00 00 00 00 10 80 08 A4
3110: 00 00 00 00 02 10 08 00 2A
3118: 01 00 10 00 0C 00 00 00 35
3120: 00 00 00 00 00 00 00 00 20
3128: 00 00 00 00 00 00 00 00 28
3130: 00 00 00 00 00 00 00 00 30
3138: 00 00 00 00 00 00 00 FF 38
3140: 20 00 20 A8 00 A8 AA AA 27
3148: A8 EA AA AC 7A AA B4 5F 6C
3150: FF D4 55 55 54 15 55 50 DE
3158: 05 55 40 00 00 00 00 00 F2
3160: 00 00 00 00 00 00 00 00 60
3168: 00 00 00 00 00 00 00 00 68
3170: 00 00 00 00 00 00 00 00 70
3178: 00 00 00 00 00 00 00 00 78
3180: 00 00 00 00 00 00 00 00 80
3188: 00 00 00 00 0A 02 80 28 3D
3190: 00 A0 2A 02 A0 23 03 20 44
3198: 00 00 00 00 20 00 00 00 B8
31A0: 00 23 03 20 2A 02 A0 28 DB
31A8: 00 A0 0A 02 80 00 00 00 D5
31B0: 00 00 00 00 00 00 00 00 B0
31B8: 00 00 00 00 00 00 00 00 B8
31C0: FF 00 C0
```

COLOR EDITOR

FROM PAGE 37

COLOREDIT

```
•100 REM *** COLOR EDITOR LOADER ***        IJ
•110 CE=4864:REM WILL RELOCATE              BE
•120 CK=0                                   OL
•130 READD:CK=CK+D:IFD=999THEN150           AG
•140 GOTO130                                KO
•150 IFCK<>38505THENPRINT"ERROR IN DATA":
END                                         JN
•160 RESTORE                                CM
•170 SA=CE:NA=SA                            HC
•180 READD:IFD=999THEN230                   AL
•190 IFD=>0THENPOKENA,D:GOTO220             LP
•200 AD=SA+256+ABS(D):H=AD/256:L=AD-INT(A
D/256)*256                                  II
•210 POKENA,L:NA=NA+1:POKENA,H              BO
•220 NA=NA+1:GOTO180                        OA
•230 PRINT"COLOR EDITOR INSTALLED"SA"TO"N
A-1                                         FI
•240 DATA 201,5,176,22,201,4,144,125        NM
•250 DATA 173,-21,240,14,201,1,240,70       FN
•260 DATA 201,2,240,84,201,3,240,98         OG
•270 DATA 56,96,164,118,240,250,32,-78      OJ
•280 DATA 32,-71,160,255,132,207,160,240    EK
•290 DATA 132,195,32,-34,240,25,160,0       FF
•300 DATA 120,165,1,72,9,1,37,207           PD
•310 DATA 133,1,177,172,37,195,13,-22       EE
•320 DATA 145,172,104,133,1,88,32,-54       GJ
•330 DATA 208,221,169,4,141,-21,24,96       CH
•340 DATA 164,118,240,190,32,-78,32,-71     JM
•350 DATA 160,255,132,207,160,15,208,194    BO
•360 DATA 164,118,240,172,36,216,16,168     JL
•370 DATA 32,-95,32,-71,160,254,208,172     CE
•380 DATA 32,-95,32,-71,160,255,208,162     KG
•390 DATA 224,16,176,15,192,16,176,11       OB
•400 DATA 201,3,240,110,132,206,164,118     ND
•410 DATA 208,2,56,96,201,2,240,107         EH
•420 DATA 32,-60,160,255,132,207,173,-21    GE
•430 DATA 208,65,169,240,160,15,133,195     EO
•440 DATA 132,196,160,0,120,165,1,72        AH
•450 DATA 9,1,37,207,133,1,177,172          LO
•460 DATA 37,196,205,-22,208,23,177,172     FA
•470 DATA 37,195,13,-23,145,172,104,133     HD
•480 DATA 1,88,32,-24,32,-54,208,214        MO
•490 DATA 24,96,104,133,1,88,202,16         KB
•500 DATA 242,230,206,162,7,208,236,160     DB
•510 DATA 1,185,-22,10,10,10,10,153         EB
•520 DATA -22,136,16,243,169,15,160,240     JB
•530 DATA 208,174,132,206,32,-65,160,255    AI
•540 DATA 208,9,36,216,16,139,32,-65        FA
•550 DATA 160,254,132,207,208,148,4,0       IM
•560 DATA 0,32,-41,29,108,206,153,-125      NG
•570 DATA 96,32,-41,61,108,206,96,202       AF
•580 DATA 16,4,162,7,230,206,164,206        JF
•590 DATA 185,-125,96,32,193,238,76,183     IB
•600 DATA 238,32,-78,240,3,32,-95,32        GK
•610 DATA -103,160,0,132,206,162,8,96       PO
•620 DATA 160,28,132,173,160,31,132,175     IB
•630 DATA 160,232,132,174,160,0,132,172     DI
•640 DATA 96,160,216,132,173,160,219,208    KD
•650 DATA 237,164,206,141,-21,142,-22,140   IA
•660 DATA -23,169,0,162,124,157,-125,202    GE
•670 DATA 16,250,96,999                     JD
```

COLOREDIT DEMO

```
•100 CE=4864:REM COLOR EDIT LOCATION        AB
•110 P$=" PRESS ANY KEY"                    GN
```

```
•120 COLOR0,16:COLOR1,2:COLOR4,15:COLOR5,
 8:BG=RCLR(0)                                IC
•130 GRAPHIC2,1,12:COLOR0,1                  DH
•140 WINDOW0,13,39,24,1                      PP
•150 PRINT" STANDARD HI-RES[DOWN]":GOSUB4
90                                           BH
•160 BOX1,20,20,90,60,,1                     FC
•170 SLEEP2                                  OG
•180 SYS CE,1,RCLR(1)-1,RCLR(5)-1            JG
•190 SLEEP2                                  PK
•200 GOSUB480                                PE
•210 SYS CE,0,BG-1,RCLR(5)-1                 FK
•220 SLEEP2                                  BI
•230 GOSUB480                                BG
•240 SLEEP2                                  CM
•250 PRINT"[CLEAR] MULTI-COLOR/TEXT[DOWN]
"                                            BO
•260 COLOR0,16:COLOR1,2:COLOR2,3:COLOR3,4    JM
•270 GRAPHIC4,0,12:GOSUB490:SCNCLR3          KE
•280 BOX1,5,5,30,30,,1                       KH
•290 BOX2,35,35,60,60,,1                     PB
•300 BOX3,65,65,90,90,,1                     CG
•310 SLEEP2                                  HF
•320 FORI=1TO15:COLOR5,I:PRINT"COLOR EDIT
 DEMO ";                                     MJ
•330 NEXT                                    MN
•340 SLEEP2                                  IL
•350 FORI=1TO3:TYPE=I                        DM
•360 IFI=2THENTYPE=0                         PB
•370 IFI=3THENTYPE=2                         PE
•380 OC=RCLR(I)                              CP
•390 GOSUB460:NEXT                           GM
•400 SLEEP1                                  ME
•410 FORJ=0TO1                               BN
•420 FORI=0TO14:SYS CE,3,I,I+1:SLEEP.5       GB
•430 SYS CE,4:SLEEP.5:NEXT                   JM
•440 NEXT                                    DL
•450 SLEEP2:GRAPHIC2,,12::END                CL
•460 SYS CE,TYPE,OC-1,OC:SLEEP2:GOSUB480     FH
•470 RETURN                                  GF
•480 SYS CE,4:SLEEP2:RETURN                  JP
•490 PRINTP$:GETKEY A$                       CM
•500 PRINT"[UP]";CHR$(27)"Q":RETURN          IH
```

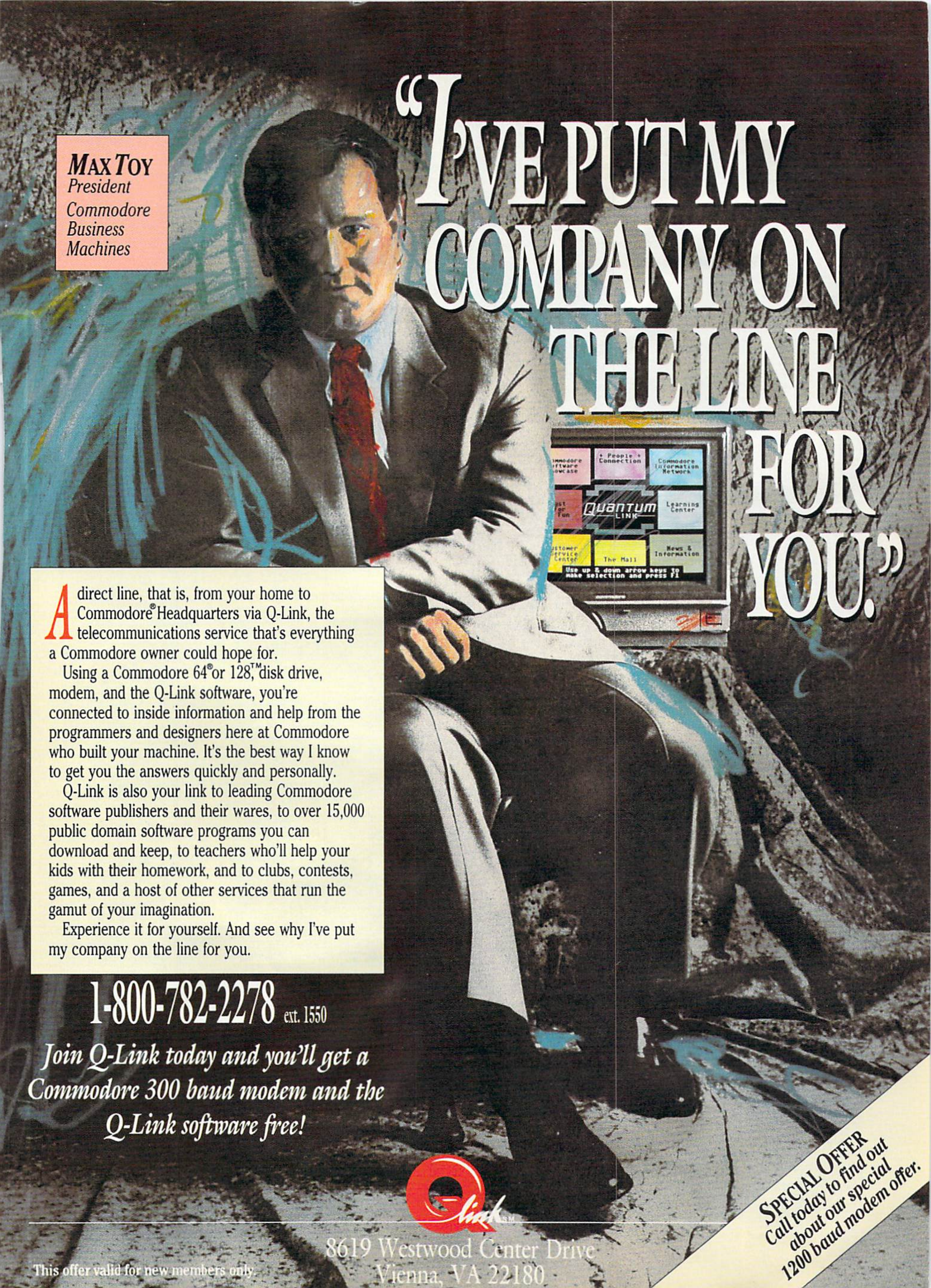
COLOR TOTAL

```
•100 REM COLOR TOTAL LOADER                  LJ
•110 CT=3072:REM RELOCATABLE START ADDR.     LB
•120 L=126:REM LENGTH                        LI
•130 CK=0                                    OJ
•140 FORI=0TOL:READD:CK=CK+D                 BB
•150 POKE CT+I,D:NEXT                        MJ
•160 IFCK<>16858THENPRINT"DATA ERROR":END    KB
•170 PRINT"COLOR TOTAL INSTALLED"CT"TO"CT
+L                                           HL
•180 DATA 201,3,144,3,76,40,125,224          DK
•190 DATA 16,176,249,133,206,134,207,32      IA
•200 DATA 116,160,165,206,201,2,240,18       HO
•210 DATA 160,28,132,173,160,31,132,175      EF
•220 DATA 160,232,132,174,160,0,132,172      KM
•230 DATA 240,15,36,216,48,3,76,231          GH
•240 DATA 119,160,216,132,173,160,219,208    IP
•250 DATA 229,132,195,132,196,162,15,165     NF
•260 DATA 206,201,1,208,10,162,240,165       JI
•270 DATA 207,10,10,10,10,133,207,134        IK
•280 DATA 206,120,165,1,72,41,254,133        PB
•290 DATA 1,177,172,37,206,197,207,208       EK
•300 DATA 6,230,195,208,2,230,196,104        EH
•310 DATA 133,1,88,32,193,238,32,183         IH
•320 DATA 238,208,222,165,196,166,195,36     AD
•330 DATA 127,48,3,76,50,142,96              EH
```

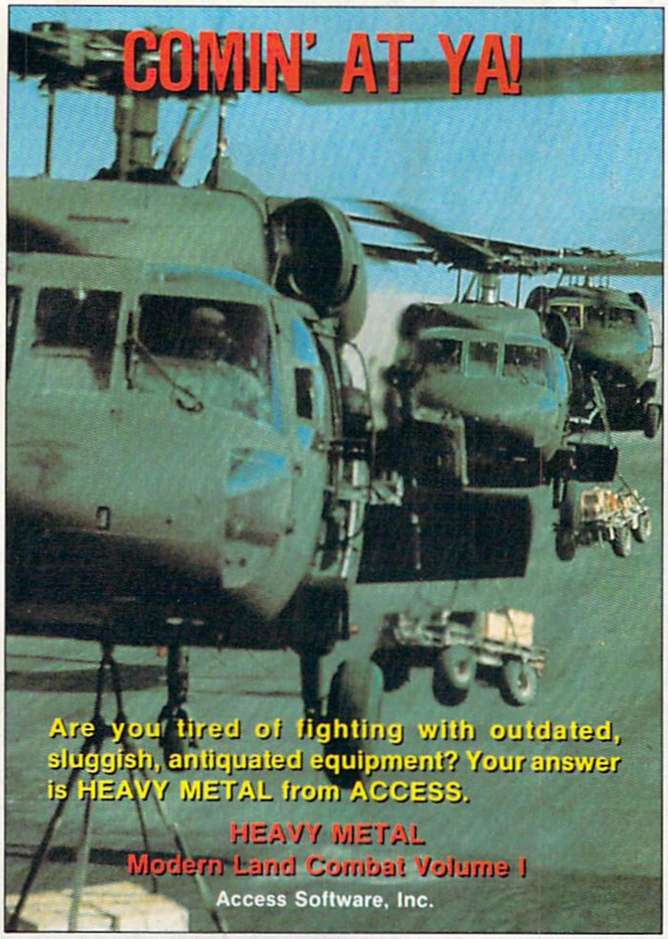
COLOR IDENTIFY

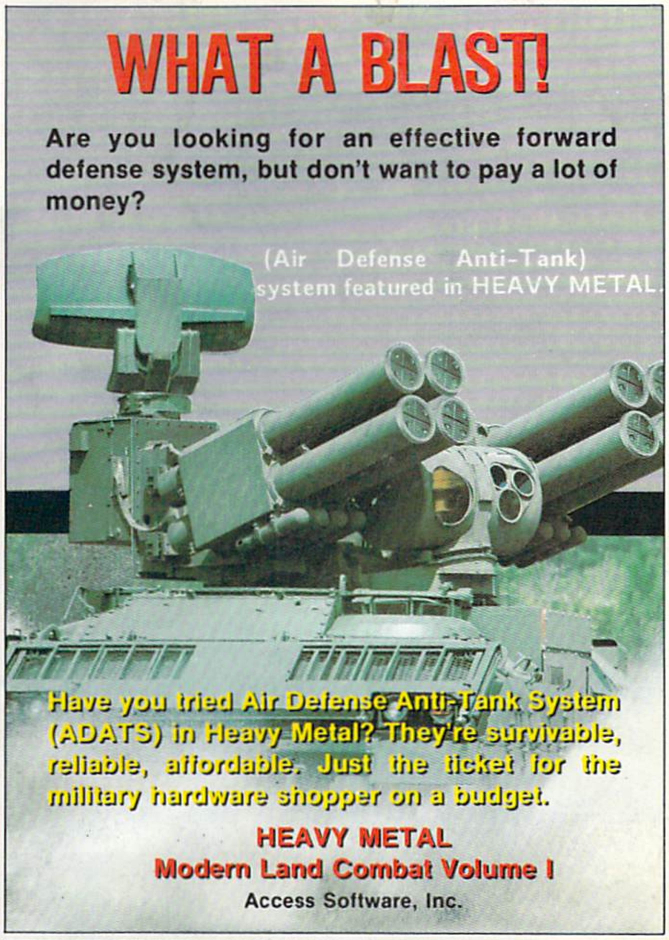
```
•100 REM COLOR IDENTIFY LOADER               HG
•110 ID=3328:REM RELOCATABLE                 FD
•120 L=88                                    ON
•130 CK=0                                    OJ
•140 FORI=0TOL:READD:CK=CK+D                 BB
•150 POKE ID+I,D:NEXT                        NL
•160 IFCK<>11135THENPRINT"DATA ERROR":END    LC
•170 PRINT"IDENTIFY INSTALLED"ID"TO"ID+L     MD
•180 DATA 201,40,144,3,76,40,125,224         KK
•190 DATA 25,176,249,168,32,116,160,189      DE
•200 DATA 51,192,133,195,189,202,156,133     OP
•210 DATA 196,152,24,101,195,144,2,230       DG
•220 DATA 196,133,195,160,0,177,195,133      DP
•230 DATA 174,165,196,24,105,188,133,196     FE
•240 DATA 162,255,36,216,16,17,120,165       PG
•250 DATA 1,72,41,254,133,1,177,195          DN
•260 DATA 41,15,170,104,133,1,88,134         EF
•270 DATA 175,165,174,170,41,15,72,138       LJ
•280 DATA 74,74,74,74,170,164,175,104        EA
•290 DATA 96                                 BI
```

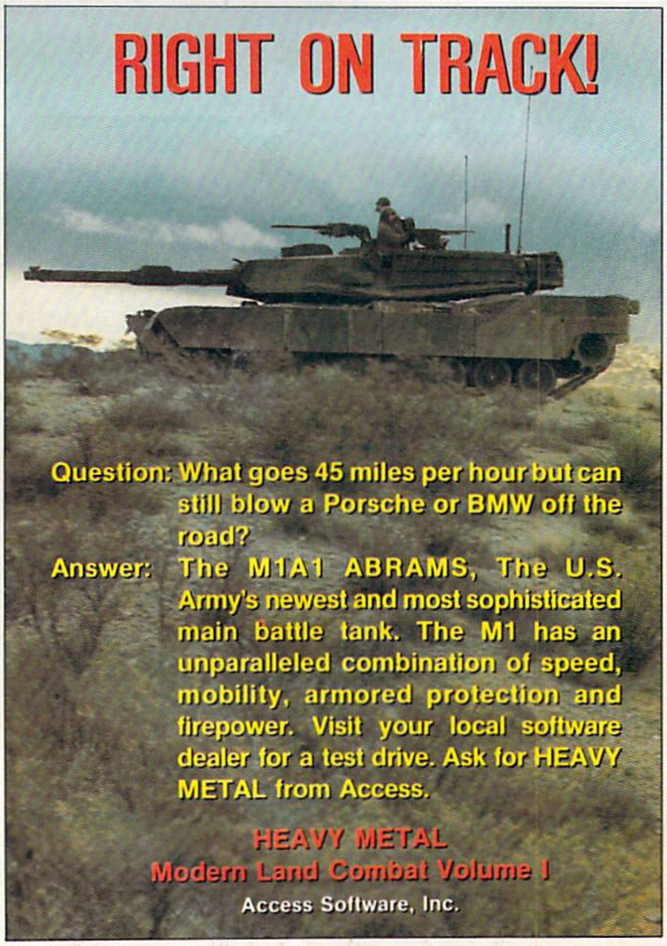

Reader Service No. 249 →

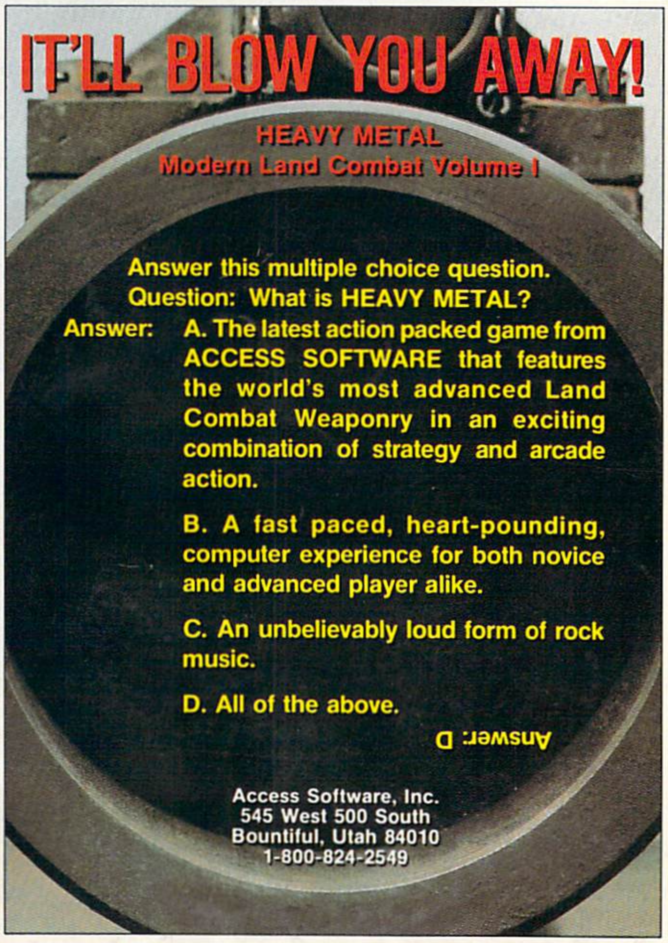


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